THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXX. No. 747.] LONDON, SEPTEMBER 4, 1877. [29TH YEAR.] Price 6d.

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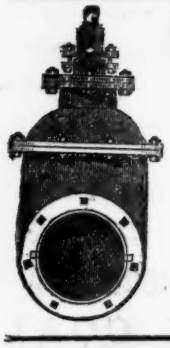

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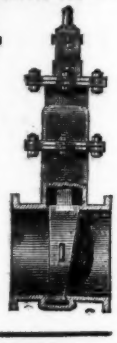

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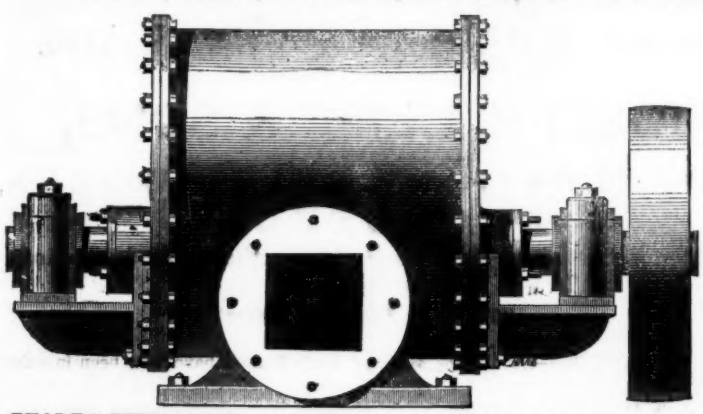

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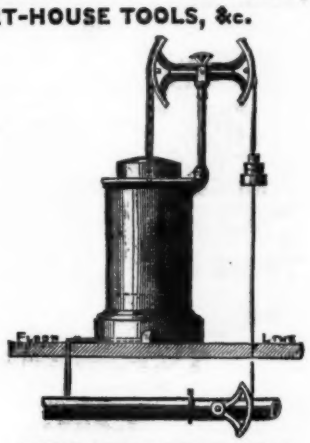

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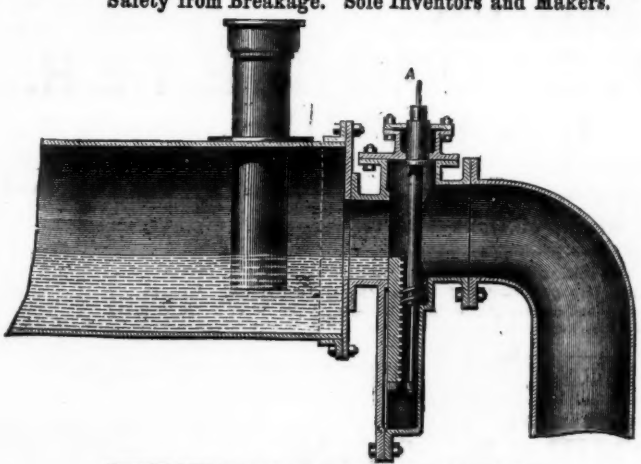

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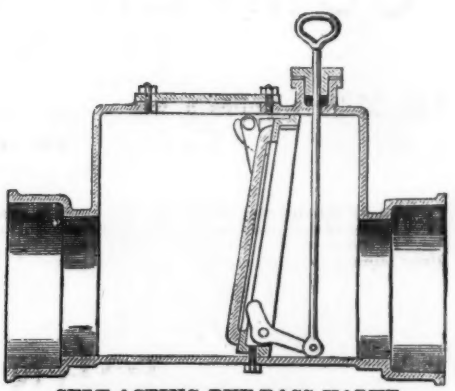

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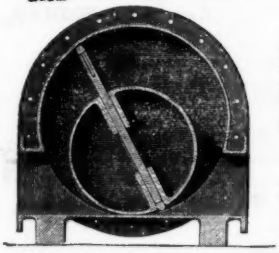

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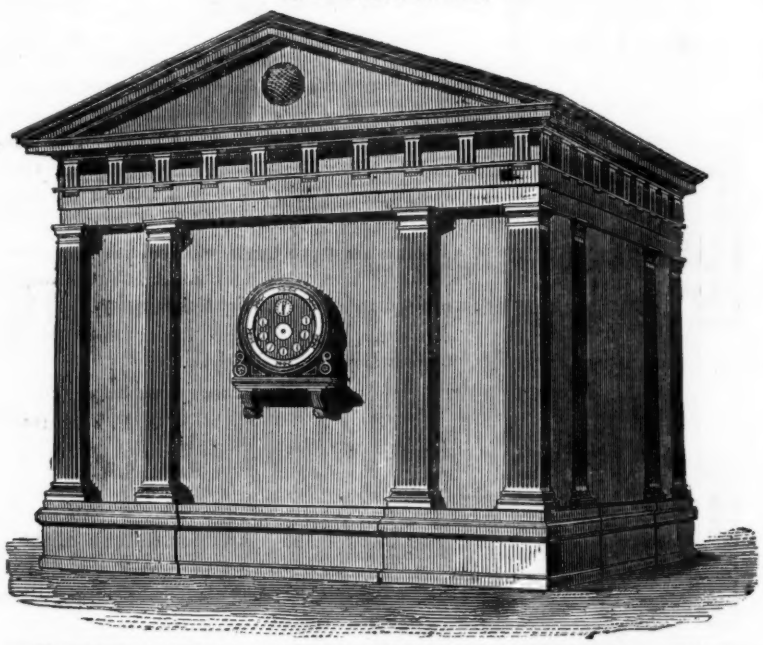

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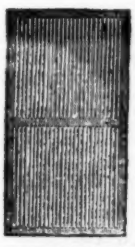

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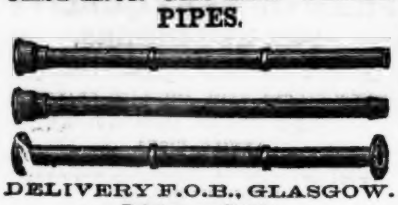

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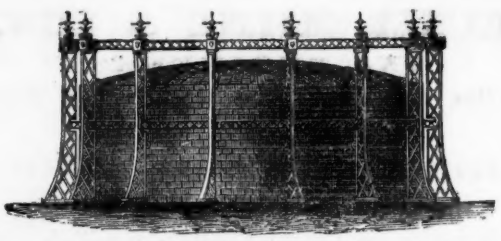

THE HORSELEY COMPANY,
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GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,
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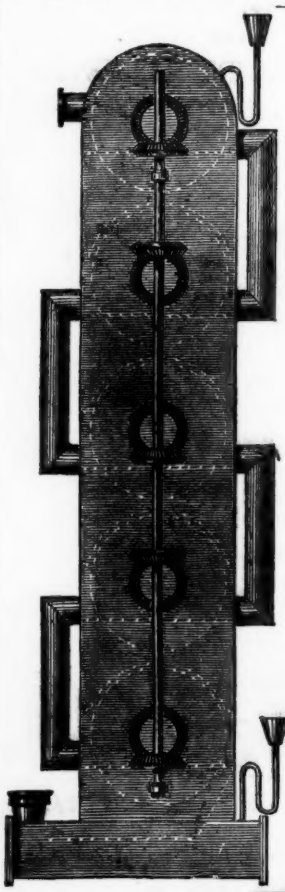

TESTIMONY OF ITS ACTION.
The Gas-Works, St. Albans,
April 27, 1877.
DEAR SIR,
Your Brush Scrubber has been in action here for four months.
It removes the whole of the ammonia from the gas, so that it will not discolour moistened turmeric paper.
The brushes cause no appreciable increase of pressure, and there is no repumping of liquor. Clear water run in at top, issues from the bottom fit to proceed to the sulphate-house.
It performs its work more efficiently than the tower scrubber I have, while only about half the height, and not one-fourth its weight or capacity.
My purifiers also last much longer before they are foul than they did previously.
I am, yours truly,
A. F. PHILLIPS.
G. Anderson, Esq.,
35*a*, Great George Street, S.W.

PATENTEE and MANUFACTURER of the following Inventions:—
RETORT SETTINGS—giving great Economy of Fuel.
STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.
FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Eighteen Illustrations and Letterpress on the Construction of Gas-Works, post free, 2s. 6d.
PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,
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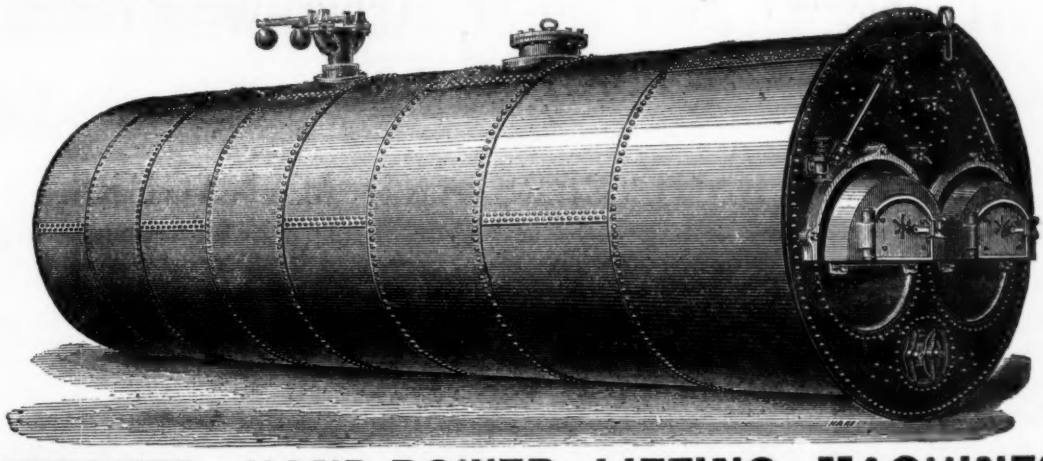
STEAM-BOILERS,

LANCASHIRE, CORNISH, EGG-ENDED, AND VERTICAL, IN ALL SIZES.

These Boilers are made of "Best" Staffordshire plates, "Best Best" iron being used where necessary. The most improved machinery is employed in their construction, and the workmanship is of the highest class throughout. Every Boiler is properly tested to under pressure before leaving the works, and a working tracing is supplied, with particulars for setting in brickwork.



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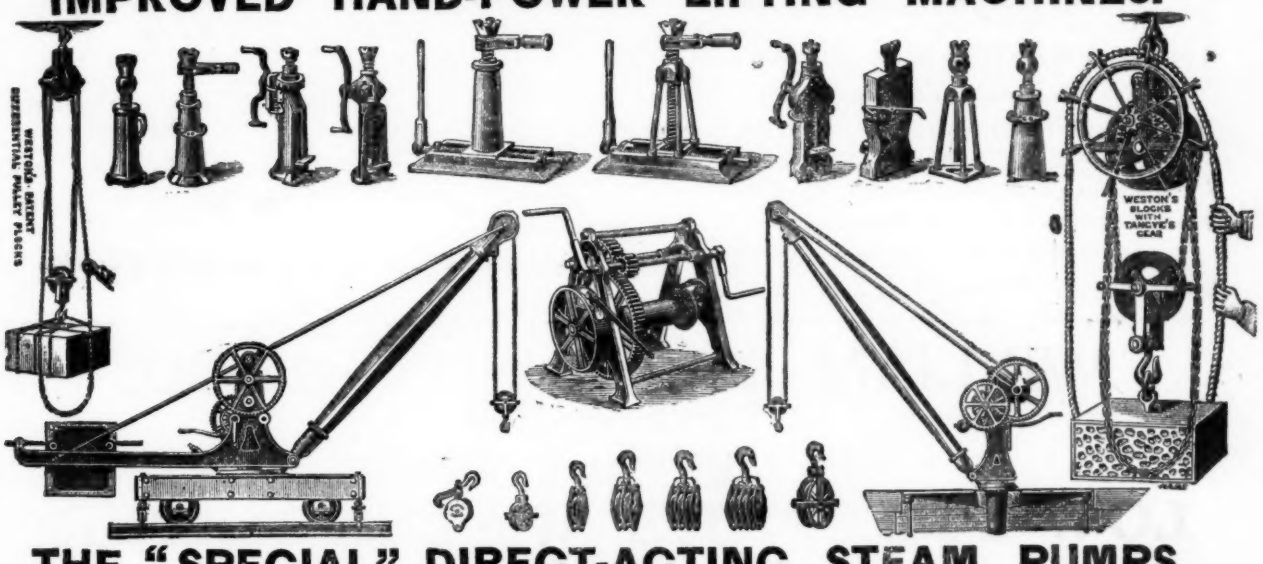
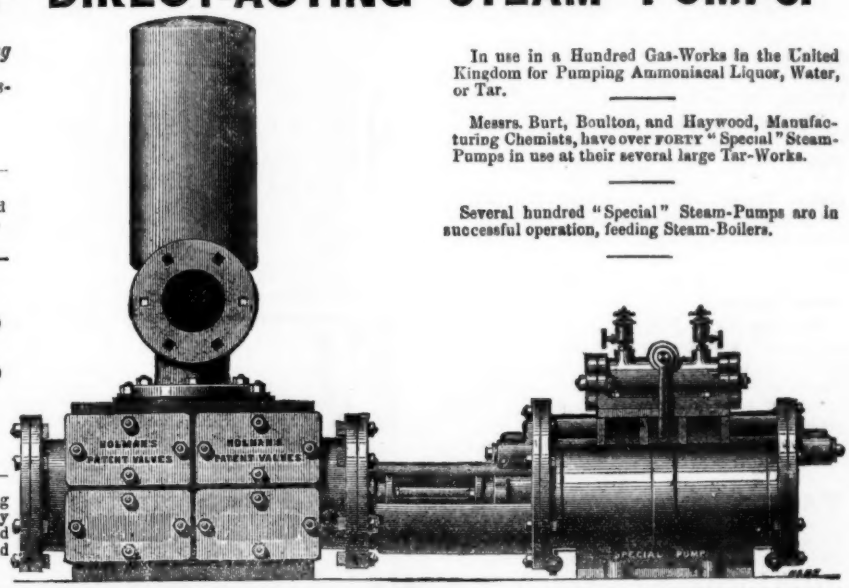


THE "SPECIAL" DIRECT-ACTING STEAM PUMPS.

Two hundred Sizes are made, the following being the leading Sizes in use in Gas-Works and Chemical Works:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4	2	9	815	18
5*	2½	12	1,250*	20
5*	3	12	1,830*	22 10
4	4	12	3,250	25
6*	4	12	3,250*	30
5	5	12	5,070	32 10
7*	5	12	5,070*	40
6	6	12	7,330	40
8*	6	12	7,330*	50
7	7	12	9,750	50
10*	7	12	9,750*	65

* These sizes being usually selected for pumping Tar and Liquor, are always in stock, or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.



In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

Messrs. Burt, Boulton, and Haywood, Manufacturing Chemists, have over FORTY "Special" Steam-Pumps in use at their several large Tar-Works.

Several hundred "Special" Steam-Pumps are in successful operation, feeding Steam-Boilers.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

TO GAS ENGINEERS AND MANAGERS.

It having come to our knowledge that a report is in circulation, spread by some unprincipled person or persons, that the cases of our larger-sized Meters are made of Galvanized Iron, we think it only fair to ourselves, and just to our customers, to say, that we never have used, in making any of our Meters, a single pound of *Galvanized Iron*, or any other *cheap* and *inferior material*, and this can be easily seen by opening any of them.

The cases of our large-sized Meters, from 20 lights and upwards, are all made of the very *Best Best Patent Alloy*, which is nearly double the price, and will last more than double the time, of some other material that has been and still is very largely used for the same purpose. And our experience, acquired by an extensive use of it for upwards of 30 years, enables us to say with confidence that no other metal in use for the purpose is so little liable to corrosion from the action of the gas.

We have now in use a Meter made in 1848, and therefore 29 years old, the case of which is made of Patent Alloy; the Meter is still in perfect order, and shows no signs of decay.

The utmost care is exercised by us in selecting none but the very best materials for all parts of our Meters; much of it is made *expressly for us*, as it is not possible to obtain it in the open market of the same superior quality.

The great fall in the price of all materials used in making our Meters has enabled us to give an increased discount, thus giving our customers the benefit of the fall. This we were bound in fairness to do, as we raised the price of our Meters four years ago, when the price of all metals went up.

It will be our constant endeavour, by using none but the best materials, and employing the most skilful workmen, to maintain the high character our Meter has hitherto borne.

WILLIAM PARKINSON & CO.

(ESTABLISHED 1816)

ARE THE ONLY MAKERS

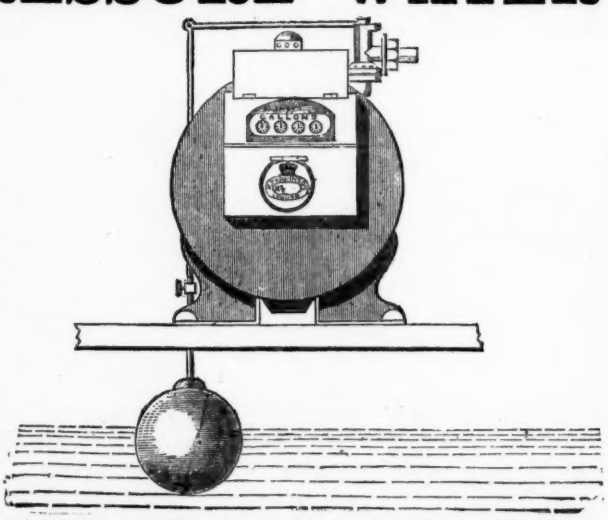
OF THE

LOW-PRESSURE WATER-METER.

These Meters will register with perfect accuracy, either at full speed, or with a few drops only passing through them.

They must be placed over the cistern to be supplied, and the water, after being measured, will fall from the outlet into the cistern below. Each Meter is fitted with a ball-valve, so made that it can be adjusted to shut off the supply at the inlet when the water reaches any required height in the cistern.

The 100-gallon Meter is fitted with a cistern holding about three or four gallons, and may be fixed inside a house, free from the effects of frost, and requires no attention after once being fixed.



From "The Engineer," April 6, 1877.

"Low-pressure Meters have been found to register with almost perfect accuracy, or, at all events, within 5 per cent. either for or against the consumer, and from the nature of their construction are by no means easily deranged. Still, even the low-pressure meters have their disadvantages, but these are chiefly as respects the question of first cost, seeing that they must have a cistern fixed at a higher level than that at which the supply is needed. All things considered, however, the balance of opinion rules at present in favour of the low-pressure Meter, and they are consequently increasing in favour as time goes on."

These Meters have been manufactured by W. P. & Co. for more than 25 years, and are largely used by the following and other Water Companies:—

NOTTINGHAM, DERBY, LEICESTER, SUNDERLAND, GREAT YARMOUTH, SHEFFIELD, NORWICH, LOWESTOFT, COVENTRY, SOUTHEND.

COTTAGE LANE, CITY ROAD, LONDON, E.C.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, SEPTEMBER 4, 1877.

Circular to Gas Companies.

THE letter of Mr. George Livesey, which we printed last week, was a welcome communication in this dull season, when journalists may be said to be compelled to make bricks without straw. We have remarked before that all Mr. Livesey writes is of interest to Gas Companies, and, although we do not always agree with him, and shall presently take objection to some of the opinions expressed in his last letter, we are bound to recognize his ardour in the defence of gas interests. No less on the present occasion we appreciate the support he gives to Mr. Bennett, whose admirable paper pointed out some of the shortcomings of Gas Companies with regard to their own interests and those of the public. Much, as was clearly shown, may be done to promote the use of gas and coke, and we are happy to see that in many places efforts are being made, invariably with success. This result is encouraging, and will, no doubt, induce other Companies to go and do likewise.

With regard to the condition of our industry, so far as regards the manufacture of gas, we may express a general agreement with Mr. Livesey, with some qualification. Considered as a whole, it must, we fear, be admitted that the manufacture remains in much the same state as it was left by Clegg and his pupils. We have still much to learn at every stage of the process. We do not know accurately what coal is, to begin with, and we have only a vague knowledge of heats. We speak of "bright red," and "cherry red," but what these expressions exactly mean, in thermometric degrees, nobody knows. And yet the quantity and quality of the gas obtainable from any given variety of coal may depend entirely on a difference of two or three hundred degrees of the temperature at which the distillation is effected.

About purification we have learnt a good deal in recent times; the reason we have not acquired more information on the subject is ascribed by different people to different causes. There are those who contend—and our contemporary, the *Chemical News*, never misses an opportunity of urging the point—that the manufacture of gas is a chemical art, and should be conducted by a chemist. We are not now, it must be understood, expressing our own opinions. It is argued that an engineer is a constructor of apparatus, and that it would be as reasonable to employ as cooks, smiths and others who make kitchen utensils, as to commit the superintendence of a purely chemical art to the care of an engineer. We shall express no opinion on this question, but leave any of our readers, who care to embark in the dispute, to answer our contemporary. The fact remains, however, that purification is still imperfect, and it can only be perfected by a chemist. That lovely oxide of iron, which Mr. Livesey regards with so much affection, is for one impurity a perfect cure; and we can hardly wonder that Mr. Livesey looks back with regret to the days when, with its exclusive use, gas-works were all "sweetness and light," and a manager's life was serene and happy. But while, as is admitted, gas engineers have been standing nearly still, the public have grown to be fastidious. They wished to be preserved from sulphur as long as possible; and the process of poor Reuben Phillips offers the means of removing the ingredient which is regarded as obnoxious. The process (*crede* Bowditch) brought the inventor nothing but trouble and misery, only ended by death; but it is a fact that, by the use of lime, and that one material by itself, the almost complete purification of gas may be effected. The removal of ammonia, of course, requires a separate process which we may say has been perfected; but lime by itself, when properly employed, suffices for the removal of carbonic acid, sulphuretted hydrogen, and bisulphide of carbon. There are compounds still left, probably containing some sulphur, which give to gas its peculiar smell, and which must be deemed impurities, but which perform a useful function. To remove these would be, as Macaulay put it in relation to a perfectly different matter, to leave the cobra his poisonous fangs, and deprive him of his warning rattle. It would be an evil day for the public if gas were made inodorous.

Passing shortly to other paragraphs in Mr. Livesey's letter, we may notice that one in which he refers to the financial management of Gas Companies. The single object Directors have always had in view has been to pay a ten per cent. dividend. In future, with the sliding scale in vogue, gas-works will be managed so as to pay, if possible, more than ten per cent. But two dangers may be said to beset the sliding scale—great prosperity—in which case the public would cry out; and another coal famine—certain, we think, to come before many years have passed—which would compel the companies to apply for a revision of their initial or standard prices. Auction clauses, for which we have no more love than our correspondent, will not, we think, improve matters. Easily got money is most frequently recklessly spent, and we may anticipate that "pre-"miums" will, in many cases, be expended on unproductive extensions.

The principle on which a Gas Manager should be remunerated is a delicate question, on which we venture to express an opinion with much diffidence. "Payment for results" has become something like a cant phrase since it emanated from the Education Office. Still, it expresses the true principle on which all labour should be rewarded. It really means, as Mr. Anderson suggests to-day, piecework. But we doubt its general applicability to the cases of Gas Managers. Many men—perhaps a majority—prefer a fixed income; but, given an enterprising directorate, a fair field, and an energetic manager, and payment for results would prove satisfactory. But such a combination is rarely to be met with. Directors will, unhappily, starve works; will not give a Manager the chance of increasing consumption, and thereby increasing profits. Under such circumstances the Manager can only take his fixed salary, and, we hope, do the best in his power. There are some other points in the letter we should have liked to notice, but, for to-day, we must defer further comment.

The accounts of the old Brighton Gas Company, which we publish in another column, though not so satisfactory as we could have wished, do not reveal a bad state of affairs. The dividend, although a little smaller than for the last half year, represents a fair rate of interest on the shareholders investments.

It is clear, however, that the time is coming when the two Gas Companies supplying Brighton and its environs must take into serious consideration the question of amalgamation. Well situated as the Black Rock works are for distribution, the expense of getting coals to them must be heavy. It is a misfortune common to most of the gas-works in our older southern watering-places, whose rapid modern extensions were not calculated upon fifty years ago.

The Lancaster Gas Company, we may remark, work up their own residuals, and find it a profitable business. Without (as we said when noticing the fact that the Chartered Company were about to commence the business) wishing to see private enterprise at all interfered with, we may express regret that Gas Companies do not more frequently work up their residuals. In small works, it is true that it would be impossible to do more than make sulphate of ammonia, as the distillation of tar requires skilled superintendence, although the cost of the necessary plant is small.

We are happy to be able once more to congratulate the Barnet District Gas and Water Company on their continued progress. The gas-rental increases at a very satisfactory rate, considering the price charged, and the prospects of the Company are excellent. Only a dividend of four and a half per cent. is declared, but investors in gas and water shares are now generally content with interest but little in excess of this amount.

We may call special attention to a paper "On Waste of Gas-light," by Mr. Bray, of Leeds, which we publish to-day. It contains valuable information and suggestions for all gas-fitters. It has been said that heaven sends meat, but that cooks come from an opposite quarter. Something like this may be said of gas and gas-fitters. It is mortifying to think that a very large proportion of the light which gas might give is commonly wasted, first, by bad apparatus, and, secondly, by a bad arrangement of the burners. That sensible plumber, with whom the writer of the paper conversed, evidently saw through the whole matter, when he said that a better technical knowledge of the subject would have to be acquired before matters could be mended. The schoolmaster is now abroad in every direction, and we may expect that, with the help of such masters as Mr. Bray, even gas-fitters may, in time, come to understand the principles of their business, and follow them out accordingly.

In the conclusion of the paper by Dr. Heumann, "On the "Theory of Luminous Flames," which we print to-day, we cannot help thinking there is indicated the way of producing an improved gas-burner. We leave the matter in the hands of those concerned in the manufacture of this apparatus, who are more competent to deal with it than we can pretend to be. But, according to Heumann, a large increase of light is obtained when a burner is made very hot close to the point at which the gas is ignited. It would be quite easy to effect this with a small increase in the consumption of gas, not exactly in the way Heumann experimented. We throw out the suggestion for those of our readers who are concerned in the manufacture of burners. It is to us a satisfaction to find that the author, after his careful experiments, supports Davy's view, that incandescent carbon particles are the source of light in gas, and what we may call all other carbonaceous flames.

Water and Sanitary Notes.

THE proposal of Messrs. Bramwell and Easton naturally continues to attract much attention, but, we rather think, finds but little support; and when it comes presently to be discussed by the Metropolitan Board, we expect to see it declined with thanks. The already overburdened metropolitan ratepayer will certainly object to an additional tax for water, while he groans under that inflicted by the Water Companies. Probably, if the proposal should come in any shape before Parliament, an attempt would be made to reduce the rates chargeable by the Companies. But such a proposition could never be entertained. The new supply would only relieve the companies of their obligation to furnish water for extinguishing fires, and the quantity of water used for this purpose is relatively a mere bagatelle. The domestic consumption of the Companies water might, or might not, be affected; but, at all events, the opportunities for consuming it would remain as now, and the Companies would have no guarantee against extravagant use and waste. In spite of Mr. Bramwell's reasoning and figures, we are satisfied that two independent supplies cannot lie side by side. The Metropolitan Water Question, we repeat, must be dealt with as a whole.

In connexion with the question of this new supply, a discussion has arisen as to the advisability of softening the water by the ingenious modification of Dr. Clark's process devised by Mr. Porter. On this point we may say that, however desirable a soft water may be for domestic use, the harder the water the better it is for extinguishing fires. When a very hard water is thrown upon a burning mass, the water is quickly evaporated, leaving a coating of carbonate of lime, which effectually damps the flames. It is further proposed to soften all the water supplied by the Metropolitan Companies by the same process. The object we regard as impossible of attainment. The quantity to be treated is so enormous that a most serious additional cost would be incurred. And then it is not required. The hardness of Thames water inconveniences nobody. Granted that the lime softening process does remove a fractional part of the organic matter, we are prepared to contend that the whole of the organic matter in Thames water is not calculated to do harm to a human body. It is present in an exceedingly minute quantity, is for the most part of vegetable origin, and has never been shown to be anything but innocuous. The softening of Thames water, therefore, to remove organic matter, would be ridiculous. To soften it to remove hardness is perfectly unnecessary.

We do not know, and shall not know until the holidays are over, what attitude the Companies will assume, under the circumstances which now present themselves. We hope, however, that we shall find them firmly banded together to resist any encroachment on their rights, and in defence of public interests.

The Native Guano Company held their annual meeting the other day—not, of course, to declare a dividend, but to pass accounts, which do not reach us, and afterwards (specially) to authorize the raising of further capital. It seems somewhat strange that a company with, perhaps, the best precipitating process extant, cannot make a profit by their treatment of sewage; but chemical processes, excellent as their prospects appear to be, seem everywhere to be failures in a financial sense. In the report which has reached us, we see no mention of Leeds, where the process is, we are informed, in high favour. The Sewage Committee of the Corporation are taking, we may say, the lead in the endeavour to purify sewage by chemical treatment, and to utilize the resulting precipitate, and there the A. B. C. process is much approved. There is a great future for a good precipitating process, and it may be that some day the hopeful shareholders in the Native Guano Company will be gladdened by the receipt of a dividend.

CONTRIBUTIONS TO THE THEORY OF LUMINOUS FLAMES.

By Dr. KARL HEUMANN.

[Translated from the *Journal für Gasbeleuchtung.*]

PART II.

(*Concluded from page* 212.)

It seemed desirable also to examine the action of flat expanded flames, issuing from slit apertures, and the narrow platinum tube was so far compressed at its open end that only a very small slit remained, and the flame became flat. The results from this burner were as follows:—

—		Light Expressed in Candles.		Consumption of Gas in Litres.		Increase of Light per Cent.	Decrease of Gas Consumption per Cent.	Degree of Light for the Decreased Gas Consumption.		Gain in Light per Cent.
		Cold Burner.	Hot Burner.	Cold Burner.	Hot Burner.			Cold Burner.*	Hot Burner.†	
		1.	2.	3.	4.	5.	6.	7.	8.	9.
Narrow platinum tube compressed to form a slit opening.	VII.	1·3	2·2	33	35·0	69·2	7·8	1·2	2·2	83·3
	VIII.	2·6	3·5	55	51·5	34·6	6·3	2·4	3·5	45·8
	IX.	4·7	5·8	90	81·0	23·4	10·0	4·2	5·8	38·0

* Calculated. † Observed, per column 4.

Here, again, it appears that by heating the burner a considerable increase of light is attained, which, as in the former experiments (I., II., and III.), is generally greater as the quantity of gas issuing from the burner is less. Especially remarkable, however, is the much diminished gas consumption with the heated burner, evidently because with a narrow orifice the action of the expanding gas on the rapidity of the jet was much more effective than it would have been with a wide orifice and wide tube.

In a former experiment, when causing a blue flame from a mixture of coal gas and carbonic acid gas to become luminous by heating the burner-tube, I had observed that the desired result did not take place if the burner-tube was heated further back, some centimètres from the open end. The reason for this appeared to be the cooling effect of the portion of the metal tube which the heated gas had still to pass, as was proved by several experiments.

It was obvious that a similar result might be looked for with the platinum burner when experimented with for the purpose of intensifying the light of unmixed coal gas by heating the burner-tube, and accordingly it appeared that the effect produced depended, in a great

measure, on the position of the heating flame. To obtain numerical results on these points, the gas consumption and light-yield of the gas-flame from the narrow platinum tube were determined; the tube was then heated to incandescence* as near the orifice as possible, and the consumption and strength of light again noted; and then, after cooling the tube again, the heating-flame was placed further back, leaving about 4 centimètres between the heated portion and the orifice.

		Intensity of Light in Candles with			Consumption of Gas with			Increase of Light per Cent.*	
		Cold Burner	Burner Heated.		Cold Burner	Burner Heated.		Burner Heated.	
			Close to the Orifice.	Further Back.		Close to the Orifice.	Further Back.	Close to the Orifice.	Further Back.
Narrow platinum tube.	X.	0·4	0·9	0·6	19	19	19·0	125·0	50·0
	XI.	2·0	3·4	2·8	48	46	44·5	78·9	55·5

* Reduced to equal consumption of gas. The diminished consumption was calculated for, as in the previous experiments.

These experiments prove that a much less effect is produced if the burner-tube is heated, not close to the orifice, but a short distance backward. The gas consumption in the latter case diminished rather more considerably than usual. The much greater proportionate increase of the intensity of the light from a feeble gas-jet with a heated burner than from a larger consumption, agrees completely with the results of the previous tables; the explanation of the exceptional excess, when the burner is heated in the middle, as shown in the last column, is probably that the rapid gas-stream parts with relatively less heat to the succeeding unheated portion of the tube than the slower stream does.

The maximum degree of light is, therefore, attained when the front portion of the burner-tube, next to the orifice of issue, is heated to incandescence. Not only is the cooling of the heated gas-stream avoided, but also the refrigerating effect of the orifice of the cold metal burner on the flame itself. The higher effect is, therefore, the result of a double cause.

The question now arises—Is the increased intensity of the light, when the burner-tube is heated, merely a consequence of the direct addition of heat to the flame, or do any chemical processes bear an important part in the result?

The experiments last cited indicate that the addition of heat in itself is the principal factor; because, for effecting a chemical change of the constituents of the gas by the heat into combinations capable of yielding more carbon in the flame, it must obviously be a matter of indifference what part of the burner is heated. In order, however, to arrive at a more certain conclusion, it was necessary to observe the effect produced on the light-intensity of a gas which had passed through a red-hot tube, and been afterwards cooled down to its normal temperature. The experiment was so arranged that the gas, after leaving the meter, first passed through a platinum tube, which could be heated to incandescence by means of a powerful Bunsen lamp. From this the gas passed into a worm immersed in water at 15° C. At the other end of the worm was fixed a slit-burner of steatite, from which the flame burned. The experiments with this apparatus showed either no difference at all in the intensity of the light, or such a slight diminution that the difference might be regarded as due merely to errors of observation.

One might, perhaps, suppose that, though a fresh combination of denser, more light-yielding hydrocarbons was formed, its illuminating effect was neutralized by a simultaneous deposit of carbon in the platinum tube; but, even after prolonged experiments, the deposit of carbon in the interior of the heated tube was quite insignificant. If it were assumed that the force of the gas-stream carried away most of the deposited carbon, it would still be deposited lower down, in the cooling worm, or else the gas escaping from the tube would exhibit a smoky or sooty appearance; but nothing of the kind was observed.

Other special experiments also showed me that a decomposition of the gas used, and deposit of carbon on passing through a heated tube, only took place to an unexpectedly small extent, as even a very slow gas-stream, yielding only a minute flame, after traversing a strongly heated tube of refractory glass for a considerable time, left scarcely any visible traces of a carbon deposit.

Possibly the low heat-conducting power of the gas may contribute to this, but the quantity of carbon deposited in gas-retorts is probably attributable far less to the marsh gas and the ethyl gas than to the denser hydrocarbons or tar vapours, which are far more readily decomposed so as to deposit carbon, even with a moderate red heat, than the former, which require a much higher temperature.

As the purified coal gas for household use contains little or none of these dense hydrocarbons and tar vapours, it is not surprising that the deposit of carbon in the platinum tube was in such small proportion.

In the worm, cooled down to 15° C. by water, drops were gradually collected, consisting partly of water, and partly of a yellowish-brown tarry liquid; as this collection only appeared when the platinum tube was heated to redness, the deposit cannot be a condensation of vapours previously existing in the gas, but only of vapours formed as products of decomposition in passing the heated tube. The quantity of the deposit was, however, so insignificant that it could not possibly have any material influence on the light. To ascertain whether any volatile hydrocarbons, such as benzole, &c., were to be found in these products of condensation, I caused pure hydrogen gas to be passed through the worm after the conclusion of the experiment, but the issuing gas (after expulsion of the coal gas) always burnt with an almost invisible flame, and even heating the few drops of liquid in the worm produced no illumination in the hydrogen gas.

I do not think, however, that these results can be considered as of universal application, but that they would be materially influenced by the quality and composition of the gas used.

The considerable increase of light in the former experiments, when the burner-tube was heated to incandescence, cannot, after what has been said, be ascribed to any decomposing effect on the gas within the tube itself, otherwise the gas, when cooled down to its original temperature, should still exhibit increased brilliancy. The direct addition of heat therefore remains as the sole, or at any rate greatly preponderating cause to be assigned for the increased development of light.

Let us refer to the object which these photometric observations were originally intended to attain—the reason for undertaking them. It was a question of determining the obstructive action of the cold burner tip, and of the cold gas entering the flame, and of proving that this deteriorating influence on the light may be removed by previously heating the gas and the burner. The same idea probably guided the inventors of various new burners, which, according to the descriptions, are all more or less advantageous from the gas being heated before it is consumed. As an instance, I may mention Cremin's burner, in which the gas first passes through a cylinder surrounding the burner-tube. This heats itself from above downwards, and warms the gas before passing into the flame. Cremin's is said to yield 60 per cent. more light than a fishtail burner.

This kind of burner, however, can only warm the gas slightly; and the warmth which, according to the explanations already given, serves to diminish the cooling effect of the issuing gas-stream—that is, to raise the temperature of the flame—is itself, in this class of burners, abstracted from the flame; for the flame heats the burner, which conveys its heat to the cold gas-stream, and so is constantly being cooled again. The burner-tube being thus kept at a low temperature, the cooling effect upon the flame must be so much the greater. On the one hand, heat is taken from the flame, and on the other returned, though, of course, with considerable loss by the way, through the heated gas. The *rationale* of such a burner appears to me to be somewhat peculiar.

I will not, *à priori*, dispute that such burners may, under special circumstances (such as high pressure, &c.), be advantageous, but I do not admit that heating the gas in such a way is the cause of the increased light. In these cases, other causes, of which diminished velocity of efflux is a prominent one, must be looked to for the increased intensity of the light. Burners, whose utility depends upon previous heating of the gas, should be so constructed that the gas is heated, not by the light-flame itself, but by the hot products of combustion, or by an independent source of heat, such as a Bunsen heat-flame. Whether in the latter case the additional cost would be more than compensated, or even balanced, by the increased light, is quite a different question.

It has been proved above that the increased light, when the burner-tube is heated, is not, or only in a very slight degree, owing to any chemical recombination of the elements of the gas, and, therefore, the addition of heat must be taken as the cause of the brilliancy.

At the first glance the action appears to be simply that the carbon separated in the flame attains a higher temperature, emits more light, and in consequence the brilliancy of the flame increases. But looking more closely at the flame when the burner is red hot, it shows that, while the luminous portion of the flame certainly emits a more intense light, becomes more brilliant, a considerable increase of the luminous envelope of the cone may also be clearly perceived. While this portion usually begins at a certain distance from the orifice, and then merely surrounds, as a thin yellow layer becoming thicker towards the top, the lower and interim dark portion of the flame; by heating the burner the luminous envelope at once becomes much thicker towards the interior, and extends downwards almost to the burner. The blue portion of the flame directly above the burner, which is pretty large with a cold burner, becomes part of the light-cone.

As the flame owes its brilliancy to the suspended incandescent carbon, and as it increases against the gas-stream, this increase must arise from the heated burner, causing the carbon to be sooner liberated in the flame than would otherwise be the case. Increase of intensity of the light of the glowing carbon particles, and earlier liberation of these latter in the flame, are therefore the effects produced by heating the burner-tube; the sum of both effects is the increased intensity of the light exhibited by the photometer.

But the character of a flame is obviously determined, not only by the total light-strength, but in a great measure also by the intensity of the light—*i.e.*, by the amount of light emitted by a single elementary particle of the light-mantle.

It appears to me that far too little attention has hitherto been given to this relation, so important to the correct determination of a flame. The photometer, it is true, shows no distinction between a small but intense light-mantle, and one larger, but less brilliant, but the eye looking direct at the flame does, being dazzled by a small concentrated flame, while it can gaze undisturbed on a larger flame emitting an equal total of light. Here, then, is a material and important difference between the sensibility of the eye and that of the photometer. But even the photometer may be made to exhibit the difference, if the flame is not examined as a whole, but only a small portion is made use of, by means of a screen with a narrow

* The heating-flame could not be brought *quite* close to the light-flame, or the latter would burn unsteadily.

carefully measured aperture. Possibly I may have an opportunity hereafter of testing a number of flames photometrically in this way; at present I will only remark that there is in commerce a very bright burning petroleum, which is much burned, notwithstanding its high price, because people are attracted by the dazzling brightness of the flame; yet the total effect observed by the photometer is far less than that from the ordinary low-priced petroleums, which yield a larger flame with equal consumption.

In order to distinguish clearly by name between these two effects, I propose to term the quantity of light emitted by individual particles of the flame the *intensity*, and to designate the total result of all the luminous particles together—that is, of the whole flame—the luminosity.

If all light-particles possessed equal intensity, the "luminosity" would be the product of the "intensity" of the light, and the volume of the light-mantle. But as this is not actually the case, it is by no means a matter of indifference in photometrical experiments to which portion of the flame the aperture of the screen is directed. Certainly, in every case, the brightest particles are to be chosen—that is, the screen should be so placed that the greatest possible quantity of light falls on the diaphragm. The numerical results will then, strictly speaking, apply only to the brightest portion of the light-mantle; but it is just this portion which is of most importance in judging of a flame.

The increased luminosity of a gas-flame, by early separation of the carbon, may be produced, not only by heating the burner or the lower portion of the flame, but also by other chemical processes. The further discussion of these processes will at the same time afford additional proof of the correctness of the assumption that carbon exists in a solid form in the luminous flame-mantle.

The following is a recapitulation of the chief deductions in the foregoing articles:—

A cold body introduced into, or close to, a luminous flame, suspends the process of combustion in its immediate vicinity by its cooling action; but it also arrests the development of light over a much larger area.

In general, carbon containing light materials will burn with or without a separation of the carbon—that is, the combustion may be luminous or non-luminous (blue), according as the temperature of the flame reaches a sufficient height for the entire consumption of the material or not. Combustibles diluted with indifferent gases require a higher temperature to effect this decomposition than would otherwise be the case.

A deposit of soot, on an object in contact with a luminous flame, is not a consequence of cooling, for lowering the temperature of the flame does not increase, but diminishes or prevents the separation of the carbon.

Soot may also be deposited on a glowing hot surface, but it is quickly consumed when exposed to the air. As air can never be entirely excluded, the deposit of soot on a hot surface will always be less than on a cold surface. The surface on which the soot is deposited simply acts as a rampart which receives bullets fired into it.

Burners formed of a good heat-conducting material, such as iron, prevent the development of light in the lower portion of the flame to a greater degree than steatite burners, the difference in the light-strength (not in itself considerable) is clearly perceptible when the burner is artificially cooled.

The burner-head and the cold gas entering the flame deprive it of much heat, especially in the lower portion, and are the causes of the light-mantle only commencing at some distance above the burner. If this latter is heated to incandescence, and the gas-stream thereby also heated, the luminosity of the flame, with equal consumption of gas, increases considerably, and the more in proportion as the gas consumption is smaller. Any possible change in the chemical composition of the gas is of no importance, as the gas-stream, when cooled again, no longer exhibits any increase of light.

The heat supplied by warming the burner-tube acts in a twofold manner; it increases the intensity of the light-mantle, and enlarges it considerably downwards. The carbon is, therefore, not only sooner separated in the flame, but glows much more intensely. The eye distinguishes both actions; the photometer only gives the total effect.

In judging a flame, it is very important to ascertain, not only the light-strength of the whole flame—the "luminosity"—but also the quantity of light emitted by an elementary particle of the luminous flame-mantle, and which has been termed above "intensity." For practical purposes (comparison of various light-sources, &c.), besides the total luminosity of the flame, the degree of light should also be determined, which, from the brightest portion of the flame, passes through a narrow, carefully-measured aperture, in a screen interposed between the flame and the photometer. The figures thus obtained may be taken as approximate values for the relative "intensity" of the light from the brightest zones of the flame.

TRURO WATER-WORKS COMPANY.—The half-yearly meeting of shareholders was held on the 25th ult.—Mr. R. F. Michell in the chair. The engineer (Mr. Shelford) stated that the contract for the execution of the works had just been signed, to be completed within six months, at a cost of £13,000, and that the negotiations for the acquirement of the necessary lands were in a forward state. The whole of the liabilities incurred to the present time were to be paid for in shares. Captain Henderson, the local engineer, bore testimony to the purity of the water to be supplied, and the report was unanimously adopted. Captain Henderson, Mr. Arthur Willyams, and Mr. R. F. Michell were elected directors, and Messrs. John James and Matthew Courtenay auditors.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

CXLIV.

VALVES (*continued*).

Messrs. C. and W. Walker are justly celebrated for the manufacture of gas-valves, to which they have devoted much attention during many years. We give a brief description, with illustrations, of some of the most useful forms of these.

Fig. 21 is an above-ground screw wedge-valve, intended principally for use on the gas-works. This valve is well adapted for purifiers when single valves are preferred, as it is opened and shut down on wedges by a screw, which it is necessary to employ when wedge-valves are used to produce a free movement to and from the seatings. The screw is protected by a cover, so as to prevent corrosion, and an indicator is geared to it to show when the port is open or shut. An underground screw-valve for shallow street-mains is shown in fig. 22. The gate in this instance progresses downwards when the handle is turned to open it. It is actuated by a square-threaded screw, which is protected from corrosion by being enclosed in a pipe connected by trunnions with the slide, and closed by a stuffing-box.

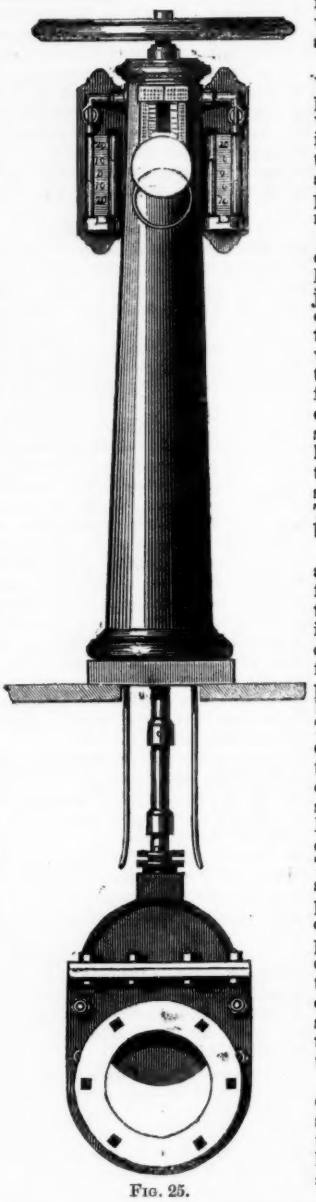


FIG. 25.

Fig. 23 is a rack-and-pinion valve; the screw is left exposed as shown for use on the works, or boxed up and working on the side for street-mains; the teeth of the rack and pinion are made strong enough to prevent their being broken by rough usage.

In fig. 24 is exhibited a double-faced valve for mains of large diameter, with surfaced joints at A and B, for taking out the screw and gate respectively. The latter is a rigid wedge of solid cast iron, havnig two perfectly scraped surface facings, fitting between those on the body, which are also surfaced; a spring in two short halves, and therefore not liable to break, is used only for scraping the front facing clean. The front facing is vertical; the back facing forms the wedge.

When a valve is made use of as an auxiliary to the governor for affording the supply of gas to a town, the regulating indicating column and valve, exhibited in fig. 25, will be found well adapted for that purpose. Its position is on the bye-pass main of the governor. The disc on the face of the column represents the extent to which the valve beneath is opened, both being actuated simultaneously by the screw. If this be observed, no mistake can arise in the working of it. The area of the opening in square inches, and the size of pipe to which the opening is equal, are also indicated by the pointer which moves with the disc. To the sides of the column two pressure-gauges are fitted, one connected to the works side of the main, and the other to the leading outlet main to the town.

The joints of all the above described valves are planed, and the several facings scraped to a perfect surface, and they have a clear fullbore in a straight line.

(*To be continued.*)

WESTON-SUPER-MARE WATER-WORKS.—The *Bristol Mercury* says: "We hear, upon what we believe to be good authority, that a preliminary agreement has been signed between the town commissioners and the directors of the water company for the sale of their works to the town upon the terms of an annual payment."

NEW MASONIC LODGE.—At Freemasons Hall, on Tuesday evening last, the "Evening Star" Lodge (1719), specially established for gas engineers, was inaugurated with the usual ceremonies of consecration and installation, by Mr. John Hervey, Grand Secretary of England, assisted by the Rev. A. F. A. Woodford, Past Grand Chaplain, and Mr. H. G. Buss, Assistant Grand Secretary. Mr. A. J. Duff Filer, P.G.S.B. of England, was installed as Master of the Lodge, Mr. John Aird and Mr. T. N. Kirkham were invested as wardens. The musical arrangements were under the direction of Mr. Thomas Lawler.

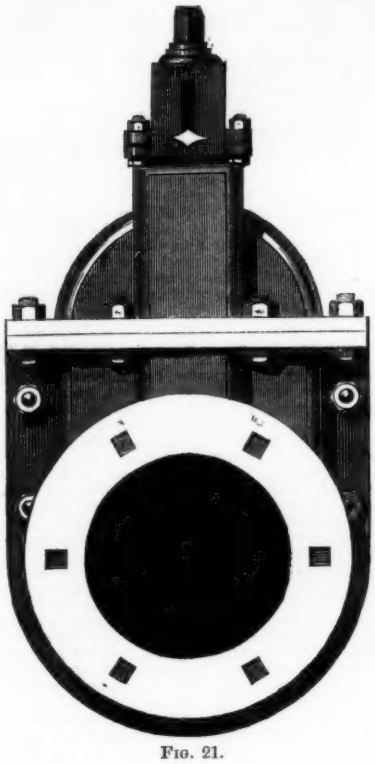


FIG. 21.

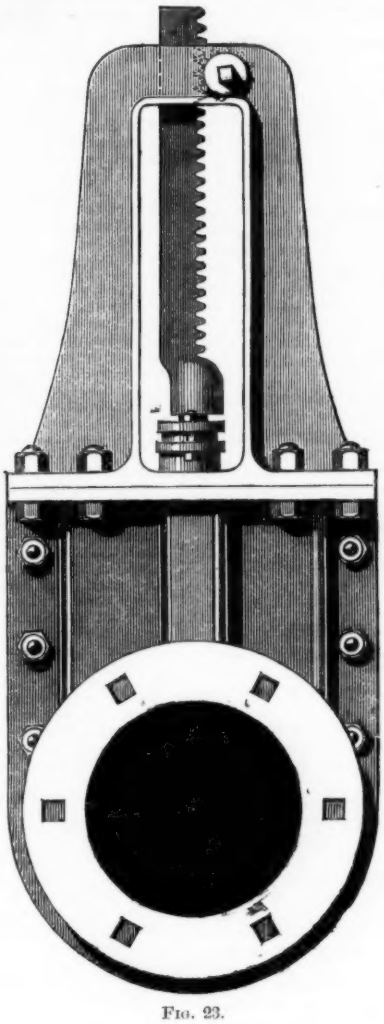


FIG. 23.

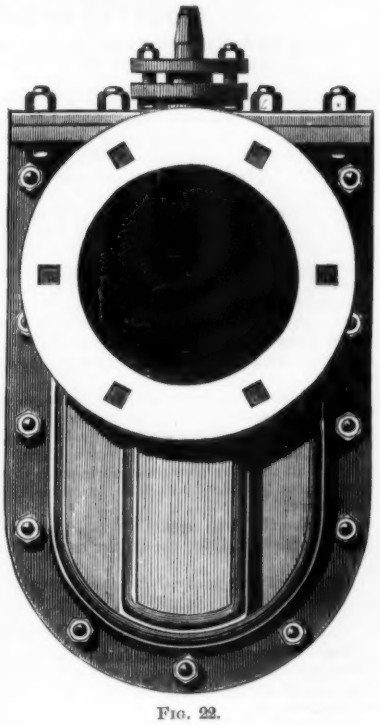


FIG. 22.

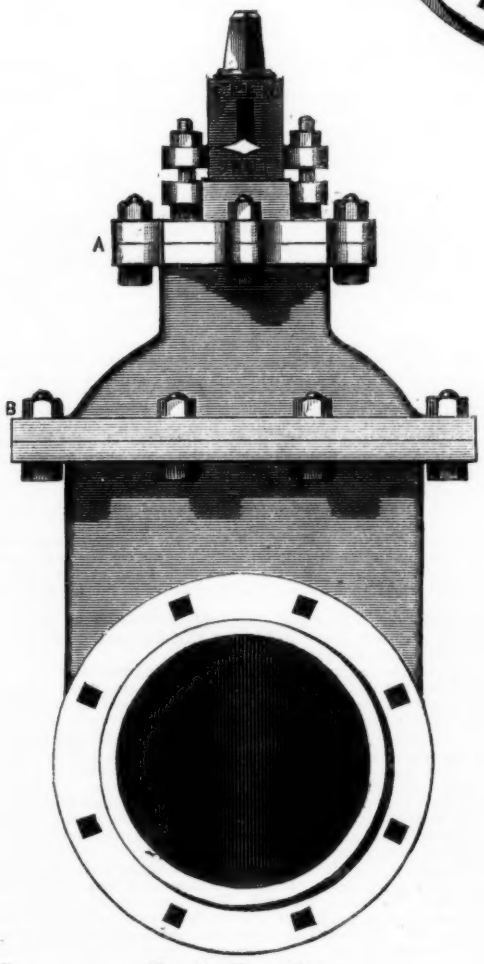


FIG. 24.—FRONT VIEW.

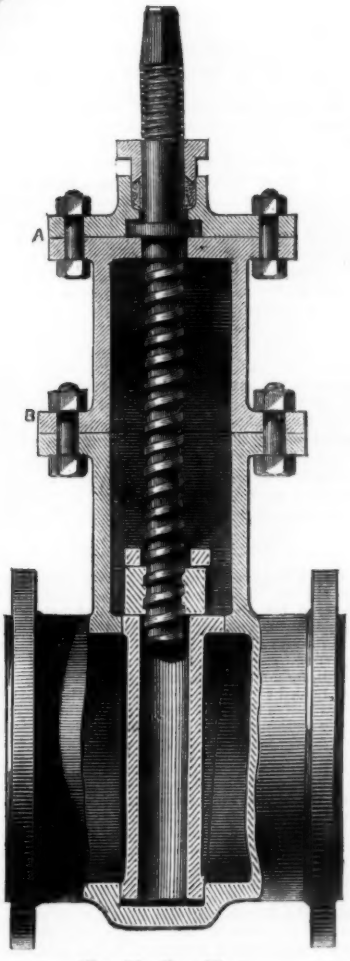


FIG. 24.—SIDE VIEW.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

PAYMENT BY RESULTS.

SIR,—I fully agree with Mr. George Livesey in his letter in your issue of the 28th ult. Doubtless you can never get a man's full force unless his self-interest is enlisted. Hence piecework in many trades; and I think Mr. Livesey has, to some extent, tried the principle with his stokers.

Mr. Livesey should now apply his principles—indicate the *modus operandi*—and perhaps it may assist him if I state that at one of my works where the unaccounted-for gas was high, I offered my manager a bonus on every 100 feet of gas brought to charge per ton of coal carbonized, in excess of an average of previous years. The plan has been in operation three or four years, and each year he has obtained his bonus, which has been about 20 per cent. added to his salary.

The same principle in large works might be applied to the foremen, and even to the stokers, based on gas made per ton of coal, and coke sold.

Would not stokers take care never to charge a leaky retort, and barrowmen never allow coke to burn away in the yard, if they had a personal interest in the working results? Directors, too, would have less to complain of, and so would shareholders.

I cannot see why shareholders income should vary with results, while the income of the men who produce those results should remain stationary.

To have the best results we must have the personal co-operation of all concerned, and this we cannot have without self-interest.

GEORGE ANDERSON.

35A, *Great George Street, Westminster, Sept.* 1, 1877.

THE NEW UNIT OF LIGHT FOR PHOTOMETRY.

SIR,—I have read with much interest the able paper by Mr. A. Vernon Harcourt on this subject, read before the Physical and Chemical Sections of the British Association, and published by you in your issue of the 28th ult.

I perfectly agree with your editorial remarks thereon, and that the "time-honoured candle," with all its imperfections, is a standard in every way more reliable than this mixture of the vapour of "pentane" and air is likely to prove.

The liquid (pentane) has to be specially prepared and supplied to gas companies, who will have to mix it with the due proportion of atmospheric air in their experimental or test holders. Apart from the practical difficulties to be encountered in the preparation of the mixture in reliable proportions in ordinary gas-works, there is the additional one of burning precisely one cubic foot of pentane gas, with a height of flame exactly determined by a platinum wire.

Mr. Harcourt states that the average results are almost identical in 30 comparative experiments made with candles and the standard gas as prepared by him.

Now, considering, as stated, that those comparisons were made by first obtaining a standard light at the gas-burner by means of comparison with candles in the ordinary way, and then substituting for candles the "double standard burner," it has very much the appearance of working a troublesome arithmetical question at school with the "key" beside you, which is comparatively easy under such circumstances, but vastly different when no such guide is near. And even with the height of flame marked by platinum wire, I venture to predict that no reliable or approximate results could be obtained by operators left to themselves, and without the aid of the much-condemned candles.

I have had some experience in using a gas-jet as a standard instead of candles, and, by means of a system of cross testings, have found it a very good and reliable way of testing the illuminating power, this being a method somewhat similar to that described by Mr. Harcourt for his "new" unit—viz., a jet of gas issuing from an orifice adjusted from numerous experiments to—in my case, say—1.32nd of an inch, the height of flame being adjusted by wire to about $1\frac{7}{8}$ inch high. This, tested from time to time by means of candles, proved to be, with the cross testings, a very simple and reliable test at all times available, without the fluctuations to which the "pentane unit" would be liable; but I certainly consider the candle indispensable as a means of counter-testing, the same as it would be in the case of the new unit of light—viz., "pentane"—thus rendering the latter valueless as a superseding agent.

However, when it is submitted to inspection at Messrs. Wright's, it will be seen whether anything further is to be developed in what all must agree to be a much desired, though not easily obtained, result.

VELA-LIMA.

NORMANTON GAS COMPANY.—The half-yearly meeting of shareholders was held on the 4th ult. The report and accounts showed that the capital had been increased by about £300, the total being £16,000. The gas-rental for the six months amounted to £1294, and receipts for coke £121, tar, lime, and ammonia £196. The total receipts on revenue account were £1648, and the expenditure £935, leaving a balance of £713, out of which the directors recommended the payment of a dividend at the rate of $7\frac{1}{2}$ per cent. This was agreed to, and at a special meeting held at the close of the ordinary business it was resolved that the directors be authorized to make application in the next session of Parliament for a special Act, and that they take all necessary steps for that purpose.

SUMMONS FOR NON-PAYMENT OF THE LIGHTING RATE.—ALLEGED IMPROPER LEVY.—Before the Cinque Ports magistrates on Friday, the 17th ult., David Hutchinson and William Goodbourne, parishioners of Birchington, were summoned to show cause why they had not paid a gas-rate made on the 3rd of July. Mr. Dorman, who appeared for the defendents, raised a number of technical points, but the main objection upon which his defence rested was that the amount which was levied by the overseers—viz., £95, did not correspond with the amount authorized by the ratepayers in meeting assembled for the adoption of the Lighting Act, which was £80. After a long investigation, the Bench held the objection to be good, and dismissed the summonses, on the ground that by the 33rd section of the Act the overseers were not empowered to raise a larger sum than that authorized by public meeting.

Legal Intelligence.

BRISTOL COUNTY COURT.—TUESDAY, AUG. 21.

(Before Mr. R. A. FISHER, *Judge, and a Jury.)*

ACTION FOR DAMAGES THROUGH THE BURSTING OF A WATER-MAIN.

BARTLETT *v.* THE BRISTOL WATER-WORKS COMPANY.

Mr. POOLE, who appeared for the plaintiff, a farmer, at Worle, near Weston-super-Mare, said the action was brought to recover the sum of £50 for personal injury and for damage occasioned to a horse and cart, &c., owing to the defective state of the water-pipes belonging to the company, and the neglect of their servant then present to warn him of the state of the road. The plaintiff was in the habit of bringing goods into Bristol on market days to be sold. On the 4th of July last he had a load of potatoes in a cart, which he was driving himself, and with several others composed a string of horses and carts and men proceeding to Bristol. Near Long Ashton the water company had a large reservoir, and there were pipes leading out of it, some of which crossed the turnpike road which the plaintiff and his fellow-travellers had to pass. As they came near this place, at half-past three in the morning, they met one of the company's turncocks, but he said nothing to them, but let them go on. When they came to the place where the pipes went underneath the road, it was covered for some distance with muddy water, but only a few inches deep. The plaintiff drove on the right side of the road, and all of a sudden down went the horse, the plaintiff was pitched out and fell on his head, the shafts of the cart were smashed, and the potatoes were scattered all over the road. The horse had put its foot into a deep hole, which was caused by the company's pipes bursting underneath the road. Plaintiff reckoned that he had lost £2 10s. on the potatoes; the cart and harness were damaged to the extent of £2 10s.; damage to the horse, £20; and for his own bodily suffering and loss of work he claimed £25, making a total claim of £50. The case against the water company was that, having obtained statutory powers to construct a reservoir and put pipes underneath the road, and beneath other people's property, they were bound to have the pipes in such a condition that, under ordinary circumstances, they would not cause injury by bursting. The law would excuse them under certain circumstances, such as an unusually severe frost or a tempest; but, under ordinary circumstances, they must have their property in such a condition that it could do no harm. The morning in question was a summer morning, and the company had not the excuse of a severe frost, or of an unusual flow of water to cause a pressure on the pipes, and there could be no other reason for the accident assigned but that there was a defect in the pipes.

The *Plaintiff* was called, and proved the facts of the accident, and of the amount of injury done. He said the hole which the horse put its foot into was 3½ feet deep. He could see no sign of there being a hole in the road, as the water was muddy. In cross-examination, he admitted that at the time he was on the right side of the road. He did not know that the rule of the road was to keep to the left, but said he always drove the other side.

Some witnesses having been examined in corroboration of plaintiff's statement as to the circumstances connected with the accident,

Mr. J. F. NORRIS, who appeared for the company, said he would admit that the pipe burst, and that the company were laying down new ones, but he should submit that there was no case to go to the jury. The mere fact of the pipe belonging to the company and bursting did not show any defective construction about it. The fact of the accident happening was not sufficient to call on him to reply, and therefore the plaintiff ought to be nonsuited.

The JUDGE ruled that the case ought to go to the jury.

Mr. NORRIS said he believed he should be able to prove that the pipe which burst was one of a series which was being laid down from the company's reservoir at Barrow to Bristol, under authority of an Act of Parliament. These pipes were about 21 inches in diameter, and were about 12 feet long. They were purchased from a thoroughly competent and trustworthy firm in Scotland for a fair market price, and there was no attempt to get an inferior article. They were sent from Scotland by sea, and arrived in Bristol, part in the autumn of 1875, and part in the spring of 1876. When they were landed at the Welsh Back they were examined by the company's servants, and rung with a hammer for the purpose of testing whether there were any flaws or cracks in them, and each pipe was weighed. They were then taken to the place where they were to be laid, and before they were placed in the soil each pipe was again tested by a competent foreman in the company's employ. The company, therefore, had exercised all the reasonable care and diligence which it was possible for them to exercise with a view of securing an article fit and proper for the purpose. They had used all care in procuring the pipes, in laying them down, and in maintaining them, and if the jury were satisfied that it was an accident over which the company had no control, they would have to give him their verdict. As a fact, the morning of the 4th of July was the first time that the main had been charged, and as there was always an amount of danger in charging a main, Mr. Pearson, the company's engineer, was careful that it should only be charged by lengths. The company could not do more than they had done, and he (Mr. Norris) contended there must have been contributory negligence, because by plaintiff's own showing he was going on the off side of the road instead of the near side, whereas if he had kept his proper side the accident would not have happened. The plaintiff also saw the water in the road, and it was incumbent on him to inquire the cause and where it came from. He (Mr. Norris) denied that it was the place of the company to warn the man, as there was no statutory duty making it incumbent on them to do so. If, however, the jury considered the company were liable, they did not wish to meet the case in any illiberal spirit, and he would leave the question of damages in the hands of the jury.

Mr. *Henry William Pearson*, the resident engineer of the company, corroborated what Mr. Norris had stated, that due caution had been taken in laying and testing the pipes.

The case was then adjourned until the following morning.

Mr. *Pearson*, recalled, said if it was true that the flood extended 100 yards each side of the hole, its depth at the scene of the accident must have been 7 feet, whereas plaintiff's witnesses stated it to be about 4 inches.

George Yandell, a workman employed by the defendants for 15 years, said he superintended nine men laying that section of the new main in February last year. He suspended the pipes from chains, and rung them with a hammer for the purpose of testing their soundness. On the morning of the accident he was at a certain place on the road, and found that there was a leak from one of the pipes. The very little water which came from it flowed down the channel. The water from the other burst pipe flowed down the road in streams towards Bristol, and covered about two-thirds of it to the depth of a couple of inches. He had turned off the water before discovering the second leak. In cross-examination, he said that the main was laid about 2 feet below the road. The water was only turned a quarter on at the reservoir, and did not rise from the hole in considerable volumes, but quite gently. He turned the water on at midnight, and first discovered the leakage at four o'clock in the morning. Every precaution was adopted, and he had no occasion to reject a pipe as unsound.

David Cuss, who had been in the employ of the company for 19 years, proved that on the arrival of the pipes at the Welsh Back by steamer, from Glasgow, he tested them with a hammer, weighed each one separately, and looked them over. When despatched to be laid they were apparently quite sound.

This was the case for the defendants.

Mr. NORRIS, on their behalf, addressed the jury, contending that the company had done all that could be required of them in purchasing the pipes from manufacturers of repute in the trade, and subjecting them to as severe a test as could be adopted—that was all the obligation laid upon them.

Mr. POOLE, in reply, argued that the company were responsible, because, in the absence of explanation, the very fact of the accident occurring was evidence of negligence. Had the pipes been of proper strength and properly laid this could not have happened. The cases of *Redhead v. Midland Railway Company* and *Blythe v. Birmingham Water-Works Company*, upon which the defendants relied, did not apply, because here there had been no subsequent discovery of a latent defect unascertainable before the accident; neither had the company in this instance been overcome by *vis major*. Defendants were then subjecting the mains to abnormal pressure, and were bound to adopt exceptional precautions.

The JUDGE, in summing up, said the first point for the consideration of the jury was whether the pipes as originally constructed were capable of resisting the pressure of water brought to bear upon them. The company were bound to procure pipes sufficiently strong, or to adapt the pressure to them. If there were any other practicable guarantees for security available but not used, the company were guilty of negligence, and if they apprehended a leakage, the defendants ought to have placed men on the spot to notify the fact.

The JURY, after retiring to deliberate for half an hour, returned with a verdict for the plaintiff—damages, £40.

LAMBETH POLICE COURT.—TUESDAY, AUG. 28.

(*Before Mr.* CHANCE.)

EXTINGUISHING STREET-LAMPS.

Stephen Tierney, 24, clerk, residing at 116, Lothian Road, Vassal Road, Brixton, was charged with extinguishing a lamp at Denmark Hill, and resisting lawful apprehension.

Constable 468 P said about a quarter to one o'clock that morning he saw the prisoner climb a street-lamp on Denmark Hill, and extinguish the light. Upon taking him into custody he resisted very much, and tried to strike witness. The prisoner had been drinking pretty freely. Some other young men were with him, and "larking" had evidently been going on. Witness found ten other lamps in the neighbourhood extinguished. On the way to the station prisoner offered him 10s. to let him go, and afterwards said he would give him £5 to release him.

Prisoner said he did not offer so much as £5.

Mr. CHANCE: What have you to say to the charge?

Prisoner: Well, I'm very sorry. It was only a joke, and I should not have done it only I was intoxicated.

Mr. CHANCE said such larking could not be allowed. It was a very dangerous thing to do, and a young man in the position of prisoner ought to have known better. He ordered him to pay a fine of 40s., or one month in default.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health, on the composition and quality of the metropolitan waters in August, 1877:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen. — As Nitrates, &c.	Ammonia. Saline.	Ammonia. Organic.	Hardness (Clarke's Scale). Before Boiling.	Hardness (Clarke's Scale). After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·40	0·024	0·099	0·000	0·007	12·1	3·0
West Middlesex	16·00	0·048	0·090	0·001	0·007	12·6	3·0
Southwark and Vauxhall	16·70	0·052	0·105	0·000	0·007	12·1	2·4
Chelsea	18·60	0·021	0·133	0·000	0·009	13·2	3·0
Lambeth	17·70	0·077	0·135	0·000	0·008	13·2	3·3
Other Companies.							
Kent	28·00	0·003	0·375	0·000	0·002	19·4	5·6
New River	17·90	0·024	0·129	0·000	0·009	12·6	3·0
East London	17·90	0·063	0·105	0·000	0·006	12·1	3 7

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was very slightly turbid, namely:—Southwark and Vauxhall and Chelsea.

C. MEYMOTT TIDY, M.B.

BARNET DISTRICT GAS AND WATER COMPANY.

The Half-Yearly General Meeting of Proprietors was held at the Guildhall Tavern, in the City of London, on Friday, the 31st ult.—Mr. J. F. BONTEMS in the chair.

The SECRETARY (Mr. Alfred Lass) read the advertisement convening the meeting, and the seal was affixed to the shareholders register. The minutes of the last meeting having been read and approved, the following report was submitted:—

The directors beg to submit to the proprietors the accounts of the company for the half year ending June 30, 1877.

The annexed accounts show the financial position of the company.

The balance of profit and loss account amounts to £1909 19s., out of which the directors recommend the declaration of a dividend for the half year ending the 30th of June last at the rate of 4½ per cent. per annum on the A stock and shares, and 3¼ per cent. per annum on the B stock.

The gas-rental during the half year has amounted to £3533 2s., which shows an increase of £157 6s. 9d. on the corresponding period of last year. The water-rental has amounted to £1872 4s. 11d., which shows, on the same period, an increase of £242 11s. 11d.

The new well and the erection of the duplicate machinery have been completed, and your directors are happy to congratulate you on the great success which has been achieved, the yield of water from the new well being more than sufficient to meet the requirements of the district for many years to come.

The duplicate machinery and the two sources of supply which are now at command render the position of the company secure.

The water-mains are now being considerably enlarged, and, when completed, great economy will be effected.

The erection of the new gasholder has been postponed till next year.

The dividend, if sanctioned, will be payable on the 17th of September next.

Dr. Gas—Revenue Account, for the Half Year ending June 30, 1877. Cr.

Manufacture of gas—				Sale of gas—		
Coals	£1,454	3	0	Private rental	£3,230	5 9
Purifying	72	3	7	Public lighting	302	16 3
Wages	217	16	4	Rental of meters	95	4 4
Repair and maintenance, works and plant	68	11	6	Residual products—		
Salaries of engineer, &c.	83	6	8	Coke	423	7 10
Distribution of gas—				Breeze	26	14 4
Salaries, inspector and clerks.	120	5	5	Tar	98	3 6
Repair and maintenance, mains and services	37	2	5	Liquor	11	18 10
Repairing and renewing meters	23	16	9	Rent account	24	0 0
Public lamps—				Miscellaneous receipts	78	0 0
Lighting and repairing	61	13	7			
Rent, rates, and taxes—						
Rent	3	0	0			
Rates and taxes	89	16	4			
Management—						
Directors allowances	100	0	0			
Salaries, secretary and accountant	66	13	4			
Collectors commission	80	4	7			
Stationery and printing	34	15	7			
General establishment charges	61	10	3			
Auditors fees	5	5	0			
	£2,580	4	4			
Balance to profit and loss account, net revenue	1,710	6	6			
	£4,290	10	10		£4,290	10 10

Water—Revenue Account.

Coals	£445	3	1	Sale of water	£1,872	4 11
Wages	159	5	6	Rents	20	7 6
Repair and maintenance, works and plant	131	15	6	Miscellaneous receipts	50	0 0
Salaries, inspector and clerks.	25	6	10			
Repair and maintenance, mains and services	35	5	7			
Salaries of engineers, &c.	41	13	4			
Rent	20	10	0			
Rates and taxes	44	18	1			
Directors allowances	50	0	0			
Salaries, secretary, accountant, &c.	33	6	8			
Collector's commission	40	2	3			
Stationery and printing	17	7	9			
General establishment charges	30	15	1			
Auditors fees	2	12	6			
	£1,078	2	2			
Balance to profit and loss account, net revenue	864	10	3			
	£1,942	12	5		£1,942	12 5

Profit and Loss Account, Net Revenue.

Dividend paid to shareholders for the half year ending Dec. 31, 1876	£1,839	7	5	Balance brought from last account	£1,963	19 2
Income-tax	75	12	9	Revenue account, gas	1,710	6 6
Interest on loans and mortgage bonds to June 30, 1877	582	8	7	,, ,, water	864	10 3
Interest on temporary loans and moneys received in anticipation of calls	206	14	3	Fitting account	75	6 1
Balance available for dividend for the half year ending June 30, 1877	1,909	19	0			
	£4,614	2	0		£4,614	2 0

The CHAIRMAN, in moving the adoption of the report, said: I have very few remarks to make on the present occasion. But what I have to say is, I think, encouraging, except as to the amount of the dividend, because as to that, I admit that it is not quite what we desire. Still we are laying the foundation for a future dividend, which I hope will be satisfactory Every one must feel that 4½ and 3¼ per cent. are not satisfactory returns for shareholders of gas companies, but I trust we shall soon have to congratulate ourselves upon an improvement in this respect. The supply of gas and water in the district is good; so satisfactory, in fact, that we have very few complaints indeed, and what few we have will soon be remedied by the improvements in distribution that are taking place. You will see from the accounts that the expenditure of capital has not been very large during the half year—scarcely anything upon the gas-works, and upon the water-works it has chiefly related to the new well, and the new mains that have been laid down for the improved distribution. The new well, which is the most important subject I have to name to-day, is very nearly completed, and as the subject of new wells in the neighbourhood of the Metropolis is just now attracting public consideration, I think it would be interesting to you if I gave you the details both of our old well and of the new. I may say that the new well is a very great success, which you will all be pleased to hear. The old well is 146 feet deep, 40 feet in brickwork, of 6 feet diameter, and 106 feet of cylinders of 5 feet diameter, with a bore of about 10 inches for 311 feet, making the total depth of the well 457 feet. The new well is 171 feet deep, 135 feet in brickwork, of 9 feet diameter, and 36 feet in cylinders, 8 feet in diameter, with 192 feet of boring of 2 feet, and 63 feet of boring of 12½ inches, making a total depth of 426 feet. It is intended to bore a little deeper, because the old well is still the deepest by 31 feet—*i.e.*, the well and the boring together. The new well, without the borfng, is 25 feet deeper than the old well, and goes down into the chalk. The old well does not go into the chalk—only the boring, not the well itself. You see, therefore, that in all respects the new well is better than the old. The yield of the old well in 24 hours was 400,000 gallons; the yield of the new well, even at its present depth, is 500,000 gallons in 24 hours. We shall thus have a water supply of 900,000 gallons per diem, which, under proper distributive arrangements, will be sufficient for the wants of the district for many years to come. I think, therefore, you will agree with me that the results of our operations upon the new well have been highly satisfactory. I may tell you also that the machinery and the spare bricks from Finchley have all been utilized in the new well, so that we have now only left at Finchley the building, the land, and the reservoir. I think that is all I have to say about the works. We shall go on improving the distribution, and I have no doubt we shall find our income from the supply of water rapidly increasing. So soon as the inhabitants for miles round know that we have an abundant supply they will come to us for water—in fact, we find that is the case now. Within the last fortnight we have received applications from new customers, which will give us an additional £120 a year water-rental. The gas supply continues to be good. Of course, the circumstances are more of an ordinary nature with our gas-works; the new well being the great feature of our report this year. The income, you see, has increased during the half year, both from the water and from the gas supply, but not sufficient to admit of an increase in the dividend, especially as you will find we have been obliged to expend some more capital, upon which, of course, we have now to pay. With these remarks I move the adoption of the report.

Mr. PONTIFEX seconded the motion, remarking that the only addition

he would make to the chairman's statement was that there were some houses in the district, hitherto supplied by the New River Company, which would in future be supplied by the Barnet Company, adding very considerably to their rental.

A SHAREHOLDER, referring to the capital account, asked the meaning of the item, "Balance overdrawn, £3010."

The CHAIRMAN replied that it meant simply that the company had spent that amount on capital account more than they had received, and for the repayment of which more capital would have to be raised.

The motion was put and carried unanimously.

On the motion of the CHAIRMAN, seconded by Mr. JOSLIN, it was resolved that the dividends recommended in the report for the half year ending the 30th of June last be now declared at the rate of 4½ per cent. per annum on the A stock and shares, and 3½ per cent. per annum on the B stock, free of income-tax, and that the same be payable on the 17th of September.

The CHAIRMAN: That is the whole of the business of the meeting; but before we separate I should like to propose a vote of thanks to our secretary and to our engineer. We have reason to be quite satisfied with their exertions during the past half year; we feel sure that their hearts are in their work, and the directors believe it would be an encouragement to them to receive the expression of the approval of the shareholders with their efforts. I will include also Mr. Wright, our collector, in the vote I ask you to pass. It is of no use for us to supply gas and water unless we have a good collector to get in our rents. I propose a vote of thanks to Mr. Lass, Mr. Martin, Mr. Wright, and the remainder of the staff.

Mr. BALFOUR: I have great pleasure in seconding the motion, and in endorsing the remarks made by the chairman with reference to the services rendered to us as a company by our officers.

The motion was carried unanimously.

Mr. LASS: I am extremely obliged to the chairman and Mr. Balfour for the way in which they have spoken of us, and to the proprietors for the cordiality with which they have accepted this vote. I feel a pleasure in doing all I possibly can for the promotion of the interests of the Barnet Gas and Water Company.

Mr. MARTIN: I also am greatly obliged for this recognition of our exertions, and I am quite sure I may say that the whole of the staff will endeavour to do their best in the service of the company.

On the motion of Mr. GIBBONS, thanks were voted to the chairman and directors.

The CHAIRMAN, in acknowledging the compliment, said he and his colleagues were earnestly desirous to promote the success of the undertaking, and would rejoice exceedingly when they were able to pay the shareholders a better dividend, and while continuing to satisfy their customers by the supply of a good article, find themselves in a position to reduce the price of gas in the outlying parts of their district. There was a little grumbling from time to time in reference to this matter; but so long as the company could divide only 4½ and 3½ per cent. on their capital, no reasonable person could well expect them to reduce the price of gas. So soon, however, as the dividend had increased a little more, the directors would, as they had said all along, consider the charge made in the outlying district, and endeavour to bring it down more nearly to the price charged in the town.

Mr. WILKINSON also acknowledged the vote, and took occasion to remark that in the majority of instances in which complaints respecting the supply of water were now made, the fault was found to exist in the defective state of the consumers arrangements.

The proceedings then terminated.

BRIGHTON GASLIGHT AND COKE COMPANY.

The Ordinary Half-Yearly Meeting of the Proprietors of this Company was held on Thursday, the 30th ult., at the Offices, Moorgate Street Chambers, London—Mr. J. MILES in the chair.

The SECRETARY (Mr. W. Liddall) having read the notice of meeting, the following report and statements of account were presented:—

During the past six months there has been a small increase in the sale of gas, but the directors regret to have to report a great falling off in the amount realized for coke. This is the more unfortunate, as at the present time higher wages, higher local taxation, and extra outlay for renewals and alterations are weighing somewhat heavily on the revenue of the company.

The directors recommend the declaration of a dividend on the paid-up capital of the company of 4 per cent. for the half year ending the 24th of June last, free of income-tax; the same to be payable on and after the 10th of September next.

It should be borne in mind that on the present occasion dividend has to be provided for £9000 new capital beyond the amount called up at the corresponding period of the previous year.

It having been finally decided to pull down the house in St. Swithin's Lane in which for many years this company had occupied offices, it became necessary to provide new quarters—an object of not very easy attainment, in consequence of the extravagant rents required for most of those that appeared of a suitable character. After numerous inquiries and searches, the directors have taken rooms in Moorgate Street Chambers, which, if not quite so accessible to the members of the board as the former ones, afford in several respects better accommodation for the business of the company; and the directors hope that the position chosen will be found convenient for the shareholders, as well as for other parties having business to transact with the company in London.

Dr. Profit and Loss Account, for the Half Year ending June 24, 1876. Cr.

Coals	£12,561	5	0	Gas and meter-rental	£19,914	19	0
Materials for purification	359	2	0	Coke, &c.	4,096	9	4
Wages	2,430	6	8	Old stores, &c.	151	4	3
Rent, rates, and taxes	384	12	2				
Salaries, collectors commission, directors, & auditors.	1,690	17	6				
General charges	182	1	7				
Wear and tear	1,972	16	6				
Bad and doubtful debts and allowances	102	9	6				
Balance	4,389	1	8				
	£24,072	12	7		£24,072	12	7

Balance-Sheet.

Capital	£107,782	0	0	Expended on works	£88,591	1	9
Contingency-fund	5,775	12	6	Works in progress	11,998	8	3
Coal insurance account	1,725	7	1	Meters	2,142	16	7
Dividends unpaid	1,874	14	9	Coal, coke, &c., in stock	9,858	8	7
Depreciation account	1,977	3	11	Mains, service-pipes, and general stores in stock	1,605	18	4
Tradesmen's accounts, &c., owing	2,866	3	10	Sundry debtors for gas	7,380	10	1
Balance from last half year	302	2	0	,, ,, coke, &c.	2,063	11	1
This half year, as above	4,389	1	8	Cash at bankers and in hand	3,048	11	1
	£126,692	5	9		£126,692	5	9

The CHAIRMAN moved the adoption of the report, which was seconded by Mr. Walne.

Mr. R. H. Jones, Mr. Oxenham, Mr. Sarson, and others took part in the discussion which followed.

The report having been adopted, the dividend recommended by the directors was declared, and the usual votes of thanks to the directors, manager, and secretary were passed.

SOUTH SHIELDS GAS COMPANY.

The Half-Yearly Meeting of Shareholders was held on the 23rd ult.—Mr. R. WALLIS in the chair.

The following report was presented:—

Notwithstanding the reduction in the price of gas, the depressed state of trade, and the requirements of rather extensive repairs to the old works, which have now been in operation for 14 years, your directors have the pleasure to recommend the usual interim dividend of 4½ per cent. on the A stock, and 3½ per cent. on the B stock and subscribed new capital.

The exhibition of apparatus for the use of gas, other than for lighting purposes, which was inaugurated by your directors, was a great success, and promises to lead to good results. Other companies are preparing to follow our example.

The illuminating power of the gas has been shown by the analyst appointed by the corporation to be above the standard required by the company's Act of Parliament.

Dr. Profit and Loss Account, for the Half Year ending June 30, 1877. Cr.

Balance from Dec., 1876	£3,013	9	0	Dividend on A stock	£1,800	0	0
				Ditto B stock and new call	836	1	8
				Balance carried down	377	7	4
	£3,013	9	0		£3,013	9	0
Balance down	£377	7	4	Stock of coals, coke, tar, &c., from 1876	£1,356	8	8
Half year's gas and meter rental (net)	11,088	12	11	Coals and cartage	3,395	14	10
Sale of coke	1,316	18	4	Wages and superintendence	3,469	3	10
Ditto tar	673	15	7	Salaries (office)	250	0	0
Profit on ammonia	316	19	5	Ditto (collectors)	120	0	0
Corporation upholding public lamps. £463 8 5				Rents	49	14	4
Less credited last half year. 206 0 0	257	8	5	Rates	281	11	10
				Directors, auditors, and scrutineers fees	135	9	0
				Lime	149	7	5
				Water	54	17	7
Service charges, fixing meters, &c.	63	2	1	Retorts, bricks, &c.	567	16	1
Rents from property at Jarrow	2	6	0	Service-pipes, gas-cocks, iron, steel, and tin goods	851	9	0
Stock of coals, coke, tar, iron, and sundries	1,952	18	9	Castings	68	14	11
Transfer fees	2	17	6	Cartage	227	0	9
Discounts allowed off accounts	1	7	4	Paving	25	3	1
				Stationery, printing, &c.	72	2	9
				Incidentals and miscellaneous	395	3	10
				Paints, oils, &c.	79	17	0
				Wear and tear—maintaining and relaying mains, &c.	795	19	6
				Bad debts	150	5	6
				Interest on loans, &c.	417	19	8
				New meters	64	1	11
				Repaired meters	70	19	1
				Gas apparatus exhibition	285	2	10
	£16,053	13	8		£13,334	4	3
				Balance to profit	2,719	9	5
Balance brought down	£2,719	9	5		£16,053	13	8

Balance-Sheet.

Proprietors capital—				Plant, works, &c., as per last statement	£63,093	10	5
A stock	£40,000	0	0	Extensions and relay of mains during half year	513	18	3
B ,,	20,000	0	0	Hardy and Stainton, on account of scrubbers	70	11	0
New ,,	7,746	0	0		£63,677	19	8
Loan capital, mortgages, and bonds	16,900	0	0	Less wear and tear—maintaining and relaying mains, &c.	795	19	6
Revenue account, balance of profit	2,719	9	5		£62,882	0	2
Sundry accounts owing for coals, lime, iron goods, &c.	1,591	2	11	New works in progress at Jarrow	16,264	4	1
Deposits for gas	939	6	5	Horses and carts £805 19 6			
Reserve-fund	6,183	11	5	Less profit 265 9 1	540	10	5
Dividend on £5811 15s. 3d., invested in 3 per cent. Consols	92	10	2	Stock of horses food	5	5	6
				Ditto acid	13	6	2
				Ditto coals, coke, tar, &c.	1,952	18	9
				Consumers gas accounts, inclusive of quarter due June 30	5,600	6	10
				Sundry accounts owing for coke, tar, &c.	2,147	15	10
				Reserve-fund, invested in 3 per cent. Consols	5,811	15	3
				Balance with bankers	935	6	8
				Cash in hand	18	10	8
	£96,172	0	4		£96,172	0	4

The CHAIRMAN moved the adoption of the report without making any remarks.

Mr. RIDLEY seconded the motion, which was carried unanimously.

Mr. ANDERSON moved the declaration of an interim dividend of 4½ per cent. on the old stock, and of 3½ per cent. on the new stock of the company, to be paid on the 3rd inst.

Mr. HALL seconded the motion, and it was agreed to.

On the motion of Alderman GLOVER, seconded by Mr. ROBINSON, thanks were voted to the Board.

Mr. HENDERSON returned thanks on behalf of his colleagues and himself.

Dr. ARMSTRONG moved a vote of thanks to the chairman, which was carried with acclamation.

The CHAIRMAN, in replying, referred to the length of time (15 or 16 years) that he had been honoured with the position of the chairman of the company. He said the old works were almost entirely renewed, and they might consider them almost new. The Jarrow works were progressing satisfactorily, and when they were finished the company would be in a position to supply any amount of gas throughout the district, either for lighting or for other purposes. He was glad to know that the exhibition of gas apparatus, held in April last, had been productive of good results. They had had several applications for information respecting the exhibition, and it had given a general impulse throughout the country to hold similar exhibitions in large and important towns. He trusted that in another twelve or eighteen months their balance would be considerably larger, but still he considered they were in a safe and prosperous condition.

WOLVERHAMPTON GAS COMPANY.

The Half-Yearly Meeting was held on the 28th ult.—Mr. J. UNDERHILL in the chair.

The SECRETARY (Mr. A. Jones) read the following report:—

Your directors beg to lay before you their fifty-first half-yearly balance-sheet and statement of accounts, duly certified by the provisional auditor, showing the revenue for the half year ending the 30th of June to be £24,115 3s. 11d., and the expenditure £18,692 7s. 2d., leaving a balance of £5452 16s. 9d., which, added to the balance of last account, amounts to £5776 0s. 1d. From this your directors recommend the payment of a 5 per cent. dividend upon the consolidated stock, and 3 per cent. (less income-tax) upon the paid-up capital of the preference shares, payable forthwith, if approved by the meeting.

During the past half year the new retort-house at your Stafford Road works has been considerably advanced, and will be ready for work before the winter. The usual alterations, repairs, and extensions are being carried out, so as to keep your works in good order. In several districts small mains have been taken up, and much larger ones laid

in their places, and your directors consider that your works are now in efficient and proper working order.

Your directors also inform you of the death of your auditor, Mr. Benjamin Smith, who for the past 14 years has discharged his duties with great zeal and with every satisfaction to the company.

In conclusion, your directors assure you that they will continue to devote their best energies to promote the interests of the company.

The CHAIRMAN moved the adoption of the report and accounts. In doing so, he said he had to congratulate the shareholders, in the first place, on the satisfactory report which the directors were enabled to lay before them of the operations of the company during the past half year. He thought he was justified in saying, speaking from recollection, that since the commencement of those disturbing influences in regard to the price of coal and other materials, which took place some six years ago, the directors never had such a satisfactory statement of accounts to put before them as they were able to show at this meeting; of course he was speaking of this particular period of the year. The advanced price of coal had been a matter of serious anxiety to the directors for a considerable time, and he could assure them that they had done their best during that time, by practising every economy, and a judicious and liberal application of the reserve-fund, not only to pay the shareholders of the company the full amount of dividend to which they were entitled by Act of Parliament, and which they had so long been in the habit of receiving, but also to supply a good quality of gas to the public with only one advance, in the six years, on the low price to which they had previously reduced it, of 3d. per 1000 feet. These were matters of which they had reason to feel a little proud, presenting, as they did, a very favourable contrast to many other companies of a like character which had, during the same period, been obliged to raise the price of their gas considerably higher. During the past half year, and indeed for some time previous, the directors had—by a judicious application of the new capital, raised by the preference shares to which the shareholders recently gave their sanction—been able to make considerable additions to their manufacturing powers, replace many of their old mains with new ones of larger capacity, and generally in every way increase their manufacturing capabilities, so that they were now in a position to supply the public of Wolverhampton with any amount of gas they might require, not only next winter, but he hoped many more winters to come, without any further additions being necessary. He was very sorry to say that during the last half year they had lost, by death, Mr. Benjamin Smith, who for a period of 14 years had very ably discharged the duties of auditor to the company. The directors felt that they and the shareholders had lost in him a very valuable servant. With regard to the appointment of a successor, that was a matter which rested more with the shareholders, and he, on behalf of the directors, would simply express a hope that they would be able to select a suitable man for the office, as the appointment was one of great responsibility. He (the chairman) might add that since the death of Mr. Smith, his son, Mr. L. T. Smith, who had previously assisted him in his business, had had the auditing of the company's books, and had proved himself quite fitted to take his father's place. There was only one other observation he had to make, and that was this. As he remarked at the commencement, the directors had been able to carry on the operations of the company, during the trying period of the last five or six years, with only one addition to the price charged to their gas consumers of 3d. per 1000 feet. He might add that it had all along been the wish of the directors, as soon as the price of coal and other material would allow them, to bring back the price to what it was before the advance—2s. 6d. per 1000 feet. They were not in a position to do this at present, but they hoped, if nothing interfered to prevent them, to be very shortly able to announce a reduction in the price to that amount.

Mr. OWEN seconded the motion, which was carried unanimously.

The retiring directors were reappointed, and Mr. L. T. Smith elected to the vacancy in the auditorship.

On the motion of Mr. SAVAGE, seconded by Mr. LANGMAN, thanks were voted to the chairman and directors.

The CHAIRMAN, in acknowledging the compliment, said a great deal depended, in connexion with an undertaking of this character, on having a good manager and officers, and he could honestly say that both the directors and shareholders of this gas company were very much indebted to their manager and other officials for their attention to their duties, and for the zeal and energy they all displayed in furthering the company's prosperity. He moved that the best thanks of the company be accorded to their manager and other officials.

The motion was seconded by Mr. FOWLER, and carried, and acknowledged by Mr. ANNAN, who expressed a hope that when next they met, the statement of accounts would show a still more prosperous state of affairs.

LEICESTER WATER-WORKS COMPANY.

The Ordinary Half-Yearly Meeting was held on the 20th ult.—Mr. E. S. ELLIS in the chair.

The SECRETARY (Mr. J. H. Williams) read the notice convening the meeting, and the following report of the directors was presented:—

The directors herewith submit to the proprietors the accounts for the half year ending June 30, 1877, from which it appears that the gross receipts amounted to £11,738 2 1

From which deduct—

Working expenses	£2,238	2	8
Rates	617	15	4
Interest	1,282	15	6
		4,138	13 6
Leaving net profit		£7,599	8 7

Apportioned as required by the company's Act—

To the shareholders	£6,573	9	0
To the Board of Health	1,085	19	7
	£7,599	8	7
From the shareholders proportion	£6,573	9	0
Deduct income-tax	97	7	7
	£6,416	1	5
Add balance from last half year and interest	56	5	2
	£6,472	6	7

From this amount your directors recommend a dividend at the rate of 5¾ per cent. per annum for the half year (free from income-tax), leaving a balance of £201 16s. 7d. to be carried forward to the next account.

The CHAIRMAN, in moving the adoption of the report, said if the shareholders would refer to the statement of the capital account, they would find there was mentioned in the report that the outlay during the half year had been about £4600. Nearly one-half of that sum had been expended on the Gilroes reservoir, and he might say that beyond the amount already laid out, which came to the sum of £7000, a further sum of £3000 would have to be paid on account of that work. The new reservoir would be ready for use by about the middle of next month. The directors felt that the reservoir, when completed, would be an important service to the company. There had been the sum of £1226 laid out in the course of the half year for new mains which were now finished, and they must all be glad to see that item in the accounts, because it was an indication of the increasing business of the company. Turning to the other side of the account, he might mention that the last call had been paid with the exception of £25, which, no doubt, would be paid in the course of a few days, and they would require to make the remaining call of £5 upon the 1200 shares last issued, payable on Oct. 1 next, and that would complete the whole of the calls upon the last issue. The amount which they were authorized to raise on debenture stock had all been issued, so that, if any further capital was required, it would have to be raised by the issue of a number of new shares, probably at the beginning of next year. The total debenture powers of the company amounted to £64,100. Of that amount had been issued, payable to the 30th of June last, £63,874, of which amount £48,754 consisted of permanent stock at 4 per cent., and £15,346 on terminable debentures, which became due from time to time, and which, as they fell due, would, no doubt, have the money provided for their payment by the issue of permanent stock. Turning to the revenue account, he might say that there had been some fluctuations in the expenditure in various items. The total expenditure in the shape of disbursements had been £2238, as against £2194, or an increase of £44 on the half year. Then they had some increase in the rates and taxes, and he might be allowed to state that that was a very heavy item in their expenditure. The total amount they had paid in the shape of rates and taxes last year was no less than £1160. There was also a slight increase in debentures. Turning to the receipts, he remarked that they had in the last half year an item which did not now appear, and consequently they were benefited by that omission. In the last account, ending the 31st of December, there was an item for parliamentary expenses amounting to £596. This expense had all been cleared off, so that they had not this time any such amount; the result being that the net balance of the half year was £7599 against £6896 the last half year, or about £700 more. They had on the dividend account a little more to pay upon the last issue of shares than in the corresponding half year; but the result was that they were able to recommend to the shareholders a dividend of 5¾ per cent., carrying over a larger balance than they had last half year, the balance now being £204 as against £50. He hoped this statement would be fairly satisfactory to the shareholders. The revenue of the company went on steadily increasing, and he had no doubt, as they made extensions, they would, from time to time, be able still further to increase the payments to the shareholders to some moderate extent.

Mr. W. H. ELLIS seconded the motion, which was put and carried.

The CHAIRMAN next moved that a dividend at the rate of £5 15s. per cent. per annum, free from income-tax, payable on the 1st of September be declared.

Mr. I. HART seconded the motion, which was carried *nem. con.*

Mr. T. HOLYLAND, in moving a vote of thanks to the chairman, board of directors, and auditors, said he thought the shareholders might congratulate themselves upon the excellent management of the company, which augured well for their future prosperity, and showed that although the progress might be slow, it would be sure. According to the profit and loss account he saw that there was a good balance to hand over to the corporation, the sum this half year being £1085 10s. 7d., against the sum in the half year ending June, 1876, of £685 11s. 3d.

The motion having been seconded and carried,

The CHAIRMAN said he and his colleagues were much obliged to the shareholders for the vote they had so unanimously passed. It was very satisfactory to them to feel that their works were fairly prosperous, and that they supplied the town with water as well, and as cheaply, as any town in the kingdom of the magnitude of Leicester. He could assure the shareholders that the directors felt, not only on account of the pecuniary interest they had in the matter, but also on account of its being a highly desirable institution for the benefit of the town, anxious to give the concern their best and most careful attention; and it was very gratifying to them to have the approval of the shareholders. From the very nature of the business they had to conduct, the returns must be necessarily slow, but he hoped and believed that they would be sure.

The proceedings then terminated.

CHATHAM AND ROCHESTER WATER-WORKS COMPANY.

The Half-Yearly Meeting of Shareholders was held on the 21st ult.—Mr. J. BAIRD in the chair.

The SECRETARY (Mr. Heckford) read the following report:—

The directors, in presenting the balance-sheet of the company for the half year ending June 30, 1877, have the gratification to report the continued prosperity of the company, the receipts for the twelve months ended the 30th of June last showing an increase of £704 4s. 4d. over the previous year.

The directors have much pleasure in recommending that a dividend at the rate of 7 per cent. per annum (free from income-tax) be declared upon all shares which have been fully paid up on the calls due in respect of such shares prior to the 30th of June last, in proportion to the length of time which such share or calls have been paid respectively; that such dividend be payable on the 20th of September next, and that the balance of revenue account be carried forward to the next half year's account. Since the last report one of the main pumps has been lowered 42 feet, but this has been a work of great difficulty, owing to the large quantity or water continually flowing into the wells from the new works.

The directors are glad to be able to report that an abundant supply of water has been obtained, and as they consider it will be sufficient for the company's requirements for some time to come, they do not think it advisable to attempt lowering the other pumps, until the springs get lower, when the work can be carried out at much less expense.

The CHAIRMAN moved the adoption of the report, and remarked that the difficulties experienced in boring for an increased supply of water had at length been overcome, the works, so far as they had been carried, showing that the water filled up the whole of the levels, and that consequently the directors did not consider it desirable to proceed with the other proposed works.

Mr. STIGAND objected to that part of the report which recommended a dividend of 7 per cent., believing, from his examination of the matter, that the business done in the half year did not justify so high a rate. He moved as an amendment that the dividend be only 5 per cent.

Mr. CRONEEN seconded the amendment.

Mr. SYMS, one of the auditors, at the request of the chairman, made some remarks on the balance-sheet, and asserted his conviction that the dividend recommended was a perfectly legitimate one, and was made wholly out of profits. He added that the directors had charged certain amounts to revenue which might fairly have been charged to capital.

After some remarks by other shareholders in support of the motion, and in deprecation of the course adopted by the mover of the amendment,

The motion was put, and carried with two dissentients.

A formal resolution declaring a dividend at 7 per cent. per annum having been adopted, a vote of thanks to the directors, auditors, and officials of the company brought the proceedings to a close.

THREATENED DISSOLUTION OF A LOCAL BOARD.—In consequence of the Local Board of St. Columb, Cornwall, refusing to provide an efficient system of sewage in accordance with the requirements of the Local Government Board, notice has been given by the Government Department that they intend to hold an inquiry with a view to dissolving the Local Board.

THE RIVERS POLLUTION PREVENTION ACT, 1876.

The Secretary to the Local Government Board has issued the following Circular to the Clerks of Sanitary Authorities throughout the country:—

Whitehall, S.W., Aug. 6, 1877.

Sir,—I am directed by the Local Government Board to bring under the notice of the Sanitary Authorities the provisions of the Rivers Pollution Prevention Act, 1876 (39 & 40 Vict., c. 75), and in so doing to point out that, after the 15th inst., the proceedings authorized by the Act in respect of offences arising from sewage, manufacturing, or mining pollutions may be taken.

The sanitary authority are doubtless aware that it has been competent for them to enforce the prohibition against putting solid matters into streams from the date of the passing of the Act.

Offences against the Act.

Offences against the Act are divided into four classes, according as they consist of the pollution or obstruction of streams—

1. By the solid refuse of any manufactory, manufacturing process, or quarry, or any rubbish or cinders, or any other waste or any putrid solid matter.
2. By solid or liquid sewage matter.
3. By any poisonous, noxious, or polluting liquid from any factory or manufacturing process; or
4. By the solid matter from any mine in such quantities as to prejudicially interfere with the due flow of the stream; or by any poisonous, noxious, or polluting solid or liquid matter from any mine, other than water, in the same condition as drained or raised from the mine.

In proving the pollution of the stream or interference with its due flow in the first class of cases, evidence may be given of repeated acts which together cause pollution or interference, although each act, taken by itself, may not be sufficient for that purpose. It will be an offence of the second class, except in certain exceptional cases mentioned in the Act, to cause to fall or flow, or knowingly to permit to fall or flow, or to be carried into any stream, any solid or liquid sewage matter. The Board are desirous of specially drawing the attention of the sanitary authority to the provisions in relation to sewage pollutions, inasmuch as any infringement of them will render the authority liable to hostile proceedings under the Act on the part either of other sanitary authorities or any person or body of persons aggrieved by the commission of the offence.

In determining whether or not such an offence has been committed, it should be noted that a marked distinction is drawn between the cases in which the sewage is conveyed into the stream along channels, the construction of which had not been commenced at the time of the passing of the Act, and those in which it is so conveyed along channels then already existing or in process of construction. In the former cases it will be an offence against the Act for any sanitary authority to cause or permit the discharge into any stream of any solid or liquid sewage matter. In the latter, an offence will not be deemed to have been committed if it can be shown to the satisfaction of the Court having cognizance of the case that the best practicable and available means are used to render the sewage harmless. Moreover, in this class of cases, the important power has been given to the Board of suspending in any particular instance for a limited period the operation of this portion of the Act beyond the twelve months allowed by the statute, provided that they are satisfied, after local inquiry, that further time ought to be granted to the sanitary authority for the purpose of enabling them to adopt the best practicable and available means for rendering the sewage harmless. In connexion with offences of this class, it should be stated that where any local authority or any rural or urban sanitary authority have been empowered or required by any Act of Parliament to carry any sewage into the sea or any tidal waters, nothing done by such authority in pursuance of such enactment will be deemed to be an offence against the Act.

As regards pollutions from factories or manufacturing processes, a distinction is drawn, similar to that already referred to with respect to sewage pollutions, between the cases where the liquid finds its way into the stream along a channel used, constructed, or in process of construction at the date of the passing of the Act, or any new channel constructed in substitution thereof, and having its outfall at the same spot, and those in which it is conveyed into the stream along a channel not falling under either of the above descriptions.

In the former cases an offence against the Act will not be deemed to have been committed if it can be shown to the satisfaction of the Court having cognizance of the case that the person complained of is using the best practicable and reasonably available means to render the liquid harmless.

With respect to pollutions from mines, an offence will not be deemed to have been committed if it can be shown to the satisfaction of the Court that the person complained of is using the best practicable and reasonably available means to render the polluting matter harmless; and it must be observed that it is immaterial in this case whether the channel by which the discharge is effected was or was not constructed or in process of construction before the passing of the Act.

Administration of the Law.

It will be observed that the new and important powers and duties conferred upon sanitary authorities with a view to prevent the pollution of streams apply not only to rivers, streams, canals, lakes, and certain watercourses, but also to the sea to such extent, and tidal waters to such points, as may be determined by the Board.

Subject to certain restrictions contained in the Act, every sanitary authority will have power to enforce its provisions in relation to any stream which is within or which passes through or by any part of their district, and for this purpose they may institute proceedings in respect of any offence against the Act which causes within their district the pollution of any stream or an interference with its due flow. In these proceedings may be taken either against any other sanitary authority or against any person or body of persons, and whether or not the offence is committed within the district of the prosecuting authority.

Any expenses incurred by a sanitary authority in the execution of the Act will be payable as if they were expenses incurred by the authority in the execution of the Public Health Act, 1875.

Restrictions on Proceedings.

As has been already stated, an interval of twelve months from the passing of the Act is required in certain cases to elapse before proceedings can be instituted. Independent of this restriction, no proceedings can be taken in any case in respect of any offence under the Act until the expiration of two months after written notice has been given to the offender. Nor may any such proceedings be taken while other proceedings under the Act are pending in relation to the offence. No proceedings can be taken in respect of offences arising from the discharge into streams of the liquid refuse from manufactories, or the solid or liquid refuse from mines, without the consent of the Board. In giving or withholding their consent, the Board are to have regard to the industrial interests involved in the case, and to the circumstances and requirements of the locality; and they are prohibited from giving their consent to proceedings by the sanitary authority of any district which is the seat of any manufacturing industry, unless they are satisfied, after due inquiry, that means for rendering harmless the liquid refuse from the processes of such manufactures are reasonably practicable and available under all the circumstances of the case, and that no material injury will be inflicted by such proceedings on the interests of such industry.

When the consent of the Board has been given to the proceedings, it will still be competent to the person against whom they are proposed to be taken to object before the sanitary authority to their being taken; and the authority, if required in writing by such person, must thereupon allow him to be heard before them by himself, his agents, and witnesses, and after inquiry, they are to determine whether or not the proceedings shall be taken, having regard to the same considerations as those by which the Board are to be guided in giving or withholding their consent.

Where any sanitary authority have taken proceedings under the Act, it will not be competent to other sanitary authorities to do so till the party complained of has failed to carry out within a reasonable time the order of any competent Court under the Act.

It should here be mentioned that whereas proceedings in repect of other offences against the Act may be taken by any person aggrieved by the commission of the offence, the enforcement of the Act, so far as it relates to prosecutions in respect of mining and manufacturing pollutions, has for the present devolved exclusively on sanitary authorities. It must, however, be borne in mind that if the sanitary authority, on the application of any person interested, refuse to take proceedings in respect of this pollution, or to apply for the consent of the Board for that purpose, the person so interested may apply to the Board, and if they on inquiry are of opinion that the sanitary authority should take proceedings, they may give directions accordingly, in which case the authority are thereupon required by the Act to commence proceedings.

Every sanitary and other local authority having sewers under their control are required by the Act to give facilities for enabling manufacturers within their district to carry the liquids proceeding from their factories or manufacturing processes into such sewers. It is, however, expressly provided that this enactment shall not compel the authority to admit into their sewers any liquid which would prejudicially affect the sewers, or the disposal by sale, application to land, or otherwise, of the sewage matter conveyed along them, or which would, from its temperature or otherwise, be injurious in a sanitary point of view. Nor are the authorities to be required to give such facilities where their sewers are sufficient only for the requirements of their district, nor where such facilities would interfere with any order of any court of competent jurisdiction respecting the sewage of the authority.

Proceedings against Offenders.

The Act, while providing that the powers which it confers shall be cumulative, and that no act or default which would otherwise be a nuisance or contrary to law shall be legalized by it, has for the first time rendered the pollution and obstruction of streams, wherever situated, a statutory offence, in respect of which the County Court having jurisdiction in the place where the offence is committed may make a summary order requiring the offender to discontinue the pollution or obstruction. Any such order may if the offence consists in default to perform a duty, require the offender to perform the duty, and specify the manner in which this is to be done, and may impose a penalty not exceeding £50 a day for every day during which the offender continues in default. In the event of his continuing in default for a period of not less than a month, or such other shorter period as may be prescribed by the order, the County Court is enabled, in addition to the penalty imposed, to appoint one or more persons to carry the order into effect, and to provide for the recovery from the offender of the consequent expenses.

Appeals may be made from the decision of the County Court to the High Court of Justice, and any County Court plaint under the Act may be removed into the High Court of Justice by leave of any judge of such Court.

Certificates of Inspectors of the Board.

One of the most important provisions in the Act is that under which inspectors of proper qualifications appointed by the Board are authorized to grant certificates to the effect that means be used for rendering harmless any sewage or poisonous, noxious, or polluting solid or liquid matter discharged into any stream by the best or only practicable and available means under the circumstances of the particular case. Such certificates will, in all Courts and proceedings under the Act, be conclusive evidence of the fact, and they must also be taken into consideration by any Court before which any legal proceedings are pending with reference to the pollution of any stream, although such proceedings may not have been instituted under the Act. If any party is aggrieved by the granting or withholding of a certificate, an appeal may be made to the Board against the decision of the inspector, and the Board may either confirm, reverse, or modify his decision, and may make such order as to the party or parties by whom the costs of the appeal are to be borne as they may think just. The certificate will continue in force for a period to be named therein, not exceeding two years, and at the expiration of that period it may be renewed for the like or any less period. The expense of obtaining the certificate must be paid by the applicants.

The Board may state that they have already appointed Mr. Robert Rawlinson, C.B., their chief engineering inspector, and Dr. Angus Smith, F.R.S., the chief inspector under the Alkali Acts, as inspectors for granting the certificates referred to.

The above is a summary of the more important provisions of the Act so far as they relate to sanitary authorities. It is hoped they may conduce in no inconsiderable degree to the mitigation of the existing and the prevention of future pollutions, and that at the same time they will not be found to have imposed undue restrictions upon local authorities, or the manufacturing or mining interests of the country.

I am, Sir, your obedient servant,

JOHN LAMBERT, Secretary.

NOTTINGHAM CORPORATION GAS SUPPLY.

The following report and statement of accounts for the year ending the 30th of June last will be presented at the next meeting of the Nottingham Town Council:—

To the Town Council.

The Nottingham Corporation Gas Committee beg to report—

That they have conducted the business of the gas undertaking of the corporation, entrusted to them by the council, for the year ending June 30, 1877. They present herewith an abstract of their receipts and expenditure up to that time. It will be seen that there is a balance on the profit and loss account of £5781 12s. 11d. in favour of the committee, which remains at the disposal of the council, for the purposes mentioned in the 7th sub-section of the 36th section of the Nottingham Corporation Gas Act, 1874.

Your committee recommend that this sum should be carried to the credit of the reserve and sinking fund.

Your committee further recommend that the price of gas should be reduced 2d. per 1000 feet. They feel justified in again recommending a reduction, in view of the profit made during the past year, and of the favourable contracts entered into for the supply of coals for the current year.

Dated the 9th day of August, 1877. J. L. THACKERAY, Chairman.

NOTTINGHAM CORPORATION GAS SUPPLY (*continued*).

STATEMENT OF ACCOUNTS, YEAR ENDING JUNE 30, 1877.

I.—*Annuity Capital.*

Description of Capital.	Maximum Yearly Annuity.	Number of Annuities Issued.	Nominal Amount of Annuity.	Total Amount Received.	Remaining to be Issued.	Total Amount Authorized.
	£ s. d.		£ s. d.	£ s. d.	£ s. d.	£ s. d.
Annuities . .	3 5 0*	7242	50 0 0	369,434 5 0	430,565 15 0	800,000 0 0

* Up to May 8, 1851, these annuities are of the value of £3 2s. 6d. each.

II.—*Loan and Debenture Capital.*

Description.	Rate per Cent.	Total Amount Borrowed.	Remaining to be Borrowed.	Total Amounts Authorized.
	£ s. d.	£ s. d.		
Bonds, mortgages, and loans . .	4 0 0	78,044 9 10	—	—
Debenture stock . .	4 0 0	39,350 0 0	—	—
Premiums on ditto. .	—	1,054 5 0	—	—

Total annuity capital raised	£369,434 5 0
Total loan capital raised	78,044 9 10
Total debenture capital raised	40,404 5 0
	£487,882 19 10

III.—*Capital Account.*

Dr.

	Expenditure to June 30, 1876.	Expended this Year.	Total to June 30, 1877.
	£ s. d.	£ s. d.	£ s. d.
Expenditure to June 30, 1876	443,324 6 1	—	
Since that date—			
Lands acquired	..	100 0 0	
New buildings, manufacturing plant, storage works, and other structures connected with manufacture	..	24,967 1 8	
New mains, laying, paving, &c.	..	3,720 14 6	
New meters	..	2,248 1 6	
	443,324 6 1	31,035 17 8	
Total expenditure	..	..	474,360 3 9
Balance capital	..	..	13,522 16 1
			487,882 19 10

Cr.

	Certified Receipts to June 30, 1876.	Received during the Year.	Total Receipts to June 30, 1877.
	£ s. d.	£ s. d.	£ s. d.
7242 annuities, of the nominal value of £50 (actually raised by the late company . .	369,434 5 0	—	
Bonds and mortgages	88,362 0 0	15,861 9 10	
Debenture stock	..	40,404 5 0	
	457,796 5 0	56,265 14 10	
Less loans repaid	..	26,179 0 0	
	457,796 5 0	30,086 14 10	
			487,882 19 10
			487,882 19 10

IV.—*Revenue Account.*

To Manufacture of gas—		
Coals, including carriage, unloading, and expenses of depositing on works.	£51,497 16 0	
Purifying materials, oil, water, and sundries at works	2,425 15 3	
Salaries of engineers, superintendents, and clerks at works	2,295 4 4	
Wages and gratuities at works	19,088 12 0	
Repairs and maintenance of works and plant (including renewal of retorts), machines, apparatus, tools, materials, and labour	15,565 18 6	
	£90,873 6 1	
Less old materials sold	455 17 3	
		£90,417 8 10
Distribution of gas—		
Salaries of inspectors, clerks in light office, and wages	4,984 14 10	
Repair, maintenance, and renewal of mains, including wages, service-pipes, &c.	2,042 16 5	
Repairing and renewing meters	1,259 6 0	
		8,286 17 3
Public lamps—		
Lighting and repairing	..	296 0 7
Rents, rates, and taxes—		
Rents and acknowledgments	171 8 0	
Rates and taxes	2,598 5 2	
		2,769 13 2
Management—		
Salaries of clerk to committee, general manager, and clerks	1,734 11 8	
Collectors	1,087 10 0	
Stationery and printing	566 16 0	
General establishment charges and incidentals .	132 17 3	
Auditors (two years)	63 0 0	
		3,584 14 11
Law and parliamentary charges—		
Law		240 12 3
Parliamentary (oppositions)		—
Bad debts		506 4 9
Sundries		—
Balance		32,538 0 10
		£138,939 12 7

By Sale of gas—		
Private consumption, at 3s. 2d., 3s. 1d., and 3s. .	£98,272 8 9	
Public lights at 3s.	5,090 1 1	
Rental of meters	4,562 12 2	
		£107,925 2 0
Residual products—		
Coke and breeze, less labour and carriage . .	15,689 16 3	
Tar	9,679 11 8	
Ammoniacal liquor	2,613 14 9	
Refuse lime, and other purifying material . .	219 8 8	
		28,202 11 4
Sundries—		
Meters, service-pipes, brasswork, and materials of distribution .		2,230 4 9
Fines and penalties		—
Amount from reserve-fund		—
Receipts for lighting, cleaning, and repairing lamps		292 4 2
Incidental receipts		289 10 4
		£138,939 12 7

V.—*Profit and Loss Account (Net Revenue).*

Interest on loans	£3,950 2 2	Balance brought from revenue account, No. 4, being profit for the year ending June 30, 1877	£32,838 0 10
Interest on debenture stock	757 8 3		
Annuities	22,348 17 6		
Balance	5,781 12 11		
	£32,838 0 10		£32,838 0 10

VI.—*Reserve-Fund Account.*

Amount of balance carried to next account. . . .	£27,363 18 4	Balance brought from last account	£25,927 14 9
		Balance of profits, June 30, 1876	395 17 5
		Interest on amount invested	1,040 6 2
	£27,363 18 4		£27,363 18 4

VII.—*Statement of Coals.*

Description of Coals.	In Store, June 30, 1876.	Received during Year.	Carbonized or Used during Year.	In Store, June 30, 1877.
	Tons.	Tons.	Tons.	Tons.
Common . . .	7487	79,896	78,321	9062
Cannel	352	3,477	3,752	77

VIII.—*Statement of Residual Products.*

Description of Residual.	In Store, June 30, 1876 (Estimated).	Made during Year (Estimated).	Used in Manufacture during Year (Estimated).	Sold during Year.	In Store, June 30, 1877 (Estimated).
Coke and breeze . Tons.	134	52,098	19,890	31,999	343
Tar . . . . . Galls.	64,888	929,603	—	929,614	64,877
Ammoniacal liquor ,,	155,988	1,625,781	—	1,609,170	171,599

IX.—*General Balance-Sheet.*

To Capital account—		By Amount invested, reserve-fund	£27,363 18 4
Balance at credit thereof, No. 3	£13,522 16 1	Cash at bankers	3,227 2 9
Profit and loss account—		Stock on hand, June 30, 1877—	
Balance at credit thereof, No. 5	5,781 12 11	Coals	4,073 19 7
Reserve-fund account—		Coke and breeze.	83 9 1
Balance at credit thereof, No. 6	27,363 18 4	Tar and liquor	1,022 2 3
Sundry tradesmen and others, for amount due for coals, stores, &c., to June 30, 1877	1,690 17 6	Sundry stores	6,038 8 6
		Arrears outstanding	307 5 9
		Coke and other residuals	5,709 19 3
		Sundry accounts	532 19 4
	£48,359 4 10		£48,359 4 10

LANCASTER GAS COMPANY.

The Fifty-first Annual Meeting of Shareholders was held on Wednesday, the 22nd ult.—Dr. De Vitre in the chair.

The Manager (Mr. W. Fleming) read the following report of the directors:—

The accounts for the past year have been duly audited, and are now submitted for your inspection and approval.

The works are in good order, the purifiers, station-meter, and governor are now in full work, and have given every satisfaction.

The profits on the past year amount to £3545 6s. 11d., which, with the balance of £417 16s. 9d. from last account, give a sum available for dividend of £3962 17s. 8d., from which your directors recommend a dividend for the year at the rate of 10 per cent., with 2 per cent. for the year 1870, and 1 per cent. for the year 1871 (less income-tax). These payments will clear off all arrears on dividend account, making the average 10 per cent. from the consolidation of the stock in 1867.

Your directors are glad to announce that owing to favourable contracts made for the supply of cannel and coal, and the completion of extra renewals at the works, they are enabled to carry into effect the hope held out last year, and to again reduce the price of gas 3d. per 1000 cubic feet to private consumers from the commencement of the current year.

Dr. De Vitre and Mr. B. P. Gregson, two of your directors, retire by rotation at this meeting, and, being elegible, offer themselves for re-election. Mr. Edmondson, one of your auditors, retires at this meeting, and, being elegible, offers himself for re-election.

The Chairman, in moving the adoption of the report, said it, as usual, was a brief one, but it was brief because the directors wished to condense all the information they had to convey to the shareholders as much as they possibly could, leaving it to them, or any of them, to ask questions upon any details bearing upon the subject. He believed the information contained in the report was all that it was necessary for any one to know in connexion with a company of this description, but he must congratulate the shareholders, as the directors congratulated themselves, in being able to carry out a wish expressed last year, and to make a further reduction to private consumers in the price of gas. With the discount they at present allowed, and the reduction henceforth to be made, the price of gas would be about 4s. per 1000 cubic feet, and the directors maintained that that was an exceedingly low price for a town of the size of Lancaster, with the limited consumption which necessarily followed in a limited community. At Liverpool the price of gas was recently reduced to 3s. 9d. per 1000 to all consumers, large consumers as well as small private ones; and that was a principle which was being adopted throughout the country, and possibly in the future they might adopt the same principle in Lancaster. The price of 3s. 9d. per 1000 was, however, only 3d. below that at which they were able to supply the small community of Lancaster, and it was fractionally higher than the large consumers in Lancaster had to pay in comparison with the large consumers in Liverpool. It afforded the directors sincere pleasure to be in a position to make the reduction, because they had promised that as the concern flourished, and the consumption became larger year by year, they would endeavour to make a reduction as far as possible to their customers. It was with additional pleasure, therefore, that they found themselves so soon able to reduce the price 3d. per 1000 cubic feet. No doubt the proprietors would remember that within the last three or four months considerable panic had taken place in London in consequence of discoveries in connexion with the electric light, which it was alleged would interfere with the use of coal gas, and perhaps supplant it altogether as an illuminating agent for large towns. The directors had made inquiries respecting it, and other persons, probably more competent than themselves, had turned their attention to the subject, and there was not the least cause for apprehension that the electric light would supersede the use of coal gas in the lighting of towns. Many of the proprietors had possibly come to that conclusion themselves, and had ascertained that it was not adapted in any way for such a purpose, and that it would be infinitely more expensive than the largest price now paid for coal gas, even supposing the new idea was practicable; therefore they need not part with their shares in alarm on account of the electric light panic. He did not know that there was anything more to tell them, except to state that it had been the strenuous endeavour of their able manager, Mr. Fleming, supported as it had been by every member of the board of directors, to make the works, as far as practicable, model works in every sense of the word. He believed they had nearly reached that point, although there were some little matters which probably Mr. Fleming would like to see more thoroughly completed than they were already; but so far as they had gone, they were in the most practicable shape that they could possibly be. He had no doubt that if Mr. Fleming could still further carry out anything which would be of benefit to the concern, he would endeavour to do so. He had worked on their behalf as if the concern was his own. He was a most able and zealous officer, and they had benefited by his energy.

Mr. J. S. Harrison seconded the motion, which was carried unanimously.

The dividends recommended in the report were then declared, and the retiring directors and auditor were re-elected.

On the motion of Mr. Simpson, seconded by Mr. Maxsted, thanks were voted to the directors for their services during the past year.

The Chairman assured the shareholders that the directors had worked very cordially and heartily together, and they felt themselves compensated to a great extent by the confidence which the proprietors had placed in them, and he hoped that this state of things would continue as long as he remained a director.

Mr. Welch said he thought the shareholders would like, before separating, to have an opportunity of expressing their thanks to the manager for his services. No one could go round the works without feeling that they were in a great state of efficiency, and that they were arranged in the best way for the business which was carried on, and provision had been made not only for immediate requirements, but for what might be needed in future.

Mr. Blacow seconded the motion, which was heartily adopted.

Mr. Fleming said he was very much obliged to those present for their unanimous and cordial vote of thanks, and also to the directors for the cordial way in which they had treated him. It was a satisfaction to him to work either early or late for the interests of the company, and to have the confidence of the directors, as well as to work with two such good auditors. The accounts had never been better audited, and the various items had been carefully gone through.

This concluded the business.

THE COAL GAS OF THE METROPOLIS.

By Mr. T. S. Humpidge.

[From the *Journal of the Chemical Society*.]

An accurate knowledge of the constituents of the coal gas supplied to the Metropolis is of some scientific interest, and much public importance; nevertheless, few complete analyses of the metropolitan gas have been published. I am not acquainted with any complete analytical examination of the gas consumed in the Metropolis since the year 1851, when Dr. Frankland collected samples of the gas delivered by all the London companies, and made complete analyses of them.

I trust, therefore, that the following results of recent analytical and photometric observations, which I have now the honour to lay before the Chemical Society, will not be altogether unacceptable.

These results, when compared with those of Dr. Frankland, show (1) that the gas now delivered in London is no better than that supplied 25 years ago; (2) that the increase in the illuminating power announced from the various testing-stations is to be attributed to improvements in the test-burner, and not to any intrinsic augmentation in the illuminating power of the gas.

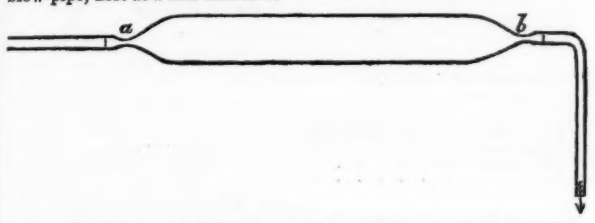
The samples of gas I have examined were collected from—

1. The Royal College of Chemistry, South Kensington, S.W.
2. The City Gas Examiner's Office, 8, Savage Gardens, E.C.
3. The Testing-House, Beckton.
4. Crane Grove, Holloway Road, N.W.
5. The Engineer's Office, Houses of Parliament.

They were all carefully collected in sealed tubes, the air of which was displaced by a rapid current of the gas. The method of collection was as follows:—

A piece of soft glass tubing, drawn out at the ends, about 5 inches long and 1 inch in diameter, was connected at one end with the supply of gas, and from the other end a long piece of caoutchouc tubing was allowed to hang.

The tube being placed horizontally, the gas was passed until all air was expelled, after which the current was stopped and the tube sealed with a blow-pipe, first at *a* and then at *b*.



The apparatus employed for the analysis of the gases was that modification of Messrs. Frankland and Ward's, described by Professor Macleod, in the Journal of this Society, vol. xxii., p. 313. The determinations could be made with great rapidity, three hours being sufficient for a complete analysis.

The per centages of the following gases were determined:—Carbonic anhydride, oxygen, nitrogen, hydrogen, marsh gas, carbonic oxide, and the hydrocarbons absorbed by fuming sulphuric acid; and the mode of analysis was that described in Bunsen's "Gasometry," and the chapter on gas analysis in Sutton's "Volumetric Analysis."

With regard to the gases absorbed by fuming sulphuric acid, their carbon density (or value of n in the formula $C_n H_m$) was determined, as well as their per centage volume. This carbon density is obviously expressed by the volume of carbonic anhydride produced by the combustion of one volume of the hydrocarbons, thus:

$$C_n \ldots\ldots + nO_2 = nCO_2 + \ldots\ldots$$

and this CO_2 was found in the following manner:—

The heavy hydrocarbons in 100 volumes of the gas were first removed, and then the volume of carbonic anhydride produced by the combustion of the residue determined. Call this A. Then the volume of carbonic anhydride produced by the combustion of 100 volumes of the entire gas was determined, and called B. Now, if the per centage of the condensable hydrocarbons be represented by C, the volume of carbonic anhydride produced by the combustion of one volume of these gases, in other words, their carbon density, or the value of n in the formula $C_n H_m$, will be—

$$\frac{B - A}{C}$$

Again, their equivalent in olefiant gas (*i.e.*, where $n = 2$), for 100 volumes of the gas, is found by multiplying their per centage by half their carbon density—*i.e.*,

$$\frac{C\,d}{2}$$

(where d = density), or substituting the value of d obtained above,

$$\frac{B - A}{2}$$

Dr. Frankland has shown that marsh gas and carbonic oxide are as much without illuminating power as hydrogen, and, therefore, that the illuminating power of a gas is quite independent of these constituents.

In the case of *cannel* gases, the illuminating power can be calculated from the equivalent of olefiant gas; but in *coal* gases, traces of other hydrocarbons are present, possibly paraffins,* which are incondensable by fuming sulphuric acid. They influence the illuminating power, however, to a scarcely perceptible extent.

Berthelot has recently stated that the coal gas of Paris owes nearly the whole of its illuminating power to the vapours of benzene, but as the vapour of benzene is absorbed by fuming sulphuric acid, this circumstance does not affect the analytical results given below. These results, moreover, show that the London gases contain considerable quantities of other illuminating hydrocarbons absorbable by sulphuric anhydride, for the carbon density of benzene vapour is 6, whereas that of the absorbable hydrocarbons in the London gases never exceeds 4·5, and averages only 3·6.

In nearly all cases, several analyses of each sample of gas were made, and as a proof of the accuracy of the method, I append the following pair of results:—

Houses of Parliament (Cannel Gas).

	CO_2.	O.	H.	CO.	CH_4.	N.	Heavy Hydrocarbons absorbed by SO_3.
1.	None.	None.	41·46	4·63	42·24	2·75	8·92
2.	None.	None.	41·72	4·98	41·88	2·71	8·72

From two places—viz., the City Gas Examiner's Office and the College of Chemistry—samples of gas were taken in the daytime and evening of the same day. The results of these analyses are given below, with those of the other samples.

By comparing these analyses made at an interval of 25 years, it is clearly seen that the real illuminating power has not increased, and that in the case of cannel gas it has actually decreased.

On examining the results obtained from different burners, it is found that the supposed improvement is due to the *burner and not to the gas*, as is seen from the following comparative photometric experiments, which

* These paraffins are said to be ethylic, propylic, and butylic hydride, particularly the two latter.

TABLE I.—*Dr. Frankland's Determinations, July*, 1851.

	—	CO_2.	O.	N.	H.	CO.	CH_4.	$CnHm$.	Carbon Density.	Equivalent in C_2H_4.
1.	*City Company*—Taken at Blackfriars (Newcastle coal)	0·53	..	..	47·60	7·32	41·50	3·05	4·57	6·97
2.	*Great Central Company*—Taken at Office, Coleman Street, 3 miles from works (Newcastle coal and cannel)	0·28	0·44	1·80	51·24	7·40	35·28	3·56	4·05	7·21
3.	*Western Company*—Taken at works, Paddington (Newcastle cannel)	0·13	0·43	1·51	25·82	7·85	51·20	13·06	3·52	22·98
4.	*Imperial Company*—Taken half a mile from Battle Bridge Works	0·29	1·20	5·01	41·15	8·02	40·66	3·67	3·35	6·15
5.	*Chartered Company*—Taken three-quarters of a mile from works, Brick Lane	None.	0·08	0·38	51·81	8·95	35·25	3·53	4·36	7·70

TABLE II.—*Determinations, May*, 1876.

1.	*Imperial Company*—Crane Grove, Holloway Road (10.30 p.m.)	None.	1·91	9·73	40·82	6·79	36·57	4·18	3·81	7·96
2.	*Chartered Company*—Beckton testing-house (noon)	None.	Traces.	3·48	50·59	3·13	38·39	4·41	3·56	7·85
3.	" " Mr. Heisch's office (11.30 a.m.)	None.	0·22	4·98	50·28	4·37	36·95	3·22	3·94	6·34
4.	" " " (9.30 p.m.)	None.	0·60	3·22	50·62	6·96	34·49	4·11	3·16	6·49
5.	" " Royal College Chemistry (noon.)	Traces.	0·26	4·93	50·68	3·98	35·89	4·08	3·26	6·65
6.	" " " " (9 p.m.)	Traces.	0·40	5·40	43·99	6·42	39·36	4·12	3·31	6·82
7.	*Houses of Parliament*—Cannel (7 p.m.)	None.	None.	2·71	41·72	4·98	41·88	8·72	4·51	19·66

were all made at the Royal College of Chemistry with the usual Bunsen photometer. Each number is the mean of ten observations.

The gas was always burnt uniformly at the rate of 5 cubic feet per hour, and the candle reduced to 120 grains of sperm per hour.

TABLE III.—*Results of Photometric Experiments.*

Burner.	June 6, four p.m.		June 28, three p.m.	
	Pressure.*	Candles.	Pressure.*	Candles.
Silber's "G" burner	3-10ths.	14·6 (α)	3-10ths.	16·6 (β)
Present Referees test-burner	8-10ths.	14·3	9-10ths.	14·5
Test-burner used from 1860 to 1866	2-10ths.	13·1	2-10ths.	12·5
Test-burner used previous to 1860.	6-10ths.	11·1	5-10ths.	10·5

* In inches of water, between the regulating-cock and the burner.

We see from these numbers that a gas which, tested by the burner used for that purpose previous to 1860, gave an illuminating power of only 10·5 candles, afforded with the present test burner a light of 14·5 candles.

Silber's Argand burners, yielding the results α and β, were marked respectively G 1556 and G 6671; α had 40 holes, whilst β had 25 holes. It is thus evident that a gas which gives, in the burners almost universally employed by consumers, a light equal to only 10·5 candles, registers when burnt in G 6671, a light equal to 16·6 candles.

In conclusion, I have to express my thanks to Dr. Frankland for his help throughout this investigation, and I append the following table, for which I am indebted to Mr. A. Vernon Harcourt, F.R.S., showing that during the month in which my experiments were made, the illuminating power of the gas delivered by the Chartered Gaslight and Coke Company never fell below the parliamentary standard of 16 candles for a consumption of 5 cubic feet per hour, *when it was tested during the prescribed hours, and with the so-called Referees burner.*

In other words, the company was strictly complying with the Act of Parliament.

Date, 1876.	The Gaslight and Coke Company.								South Metropolitan Gas Company.
	Beckton.	Bow.	Millbank.	Kensal Green.	Bromley.	Fulham.	St. Pancras.	Dalston.	Peckham.
May 1	—	—	—	—	—	—	—	—	
" 2	—	—	—	—	—	—	—	—	
" 3	16·9	16·5	21·2	16·7	—	17·1	—	—	
" 4	16·8	16·2	20·5	16·5	16·7		16·6	16·7	
" 5	17·6	16·0	20·7	16·8	16·8		17·3	17·4	
" 6	17·1	16·2	21·0	16·5	16·7		15·8	17·2	
" 8	17·4	16·1	21·1	16·5	16·2		16·0	18·0	No report
" 9	17·2	16·3	20·7	16·3	16·5		16·3	17·0	of testings
" 10	16·6	16·5	—	16·6	16·3		16·7	16·8	received.
" 11	17·2	16·4	20·5	16·8	16·6		17·0	17·7	
" 12	16·6	16·5	21·2	16·7	16·1		16·3	17·5	
" 13	17·1	16·6	—	16·5	16·4	No report	17·1	17·2	
" 15	17·0	16·5	21·0	16·7	15·8	of testings	17·3	16·4	
" 16	17·1	16·9	20·5	16·2	16·2	received.	16·8	16·8	
" 17	17·7	16·1	20·4	16·9	16·3		17·6	16·3	
" 18	18·0	16·3	—	16·5	16·7		17·1	17·5	15·2
" 19	17·3	16·5	21·7	17·4	16·6		16·2	17·6	15·1
" 20	17·2	16·3	20·5	17·7	17·1		16·5	17·4	—
" 22	18·0	16·4	20·8	16·7	16·9		16·7	17·5	—
" 23	18·3	16·8	20·8	17·2	16·5		17·8	17·3	15·6
" 24	17·2	16·8	21·2	16·9	16·8		16·7	17·5	16·6
" 25	16·8	16·7	22·2	16·6	16·4	16·8	16·6	17·7	16·3
" 26	16·8	16·7	—	16·6	16·5	16·9	16·5	17·5	—
" 27	16·6	16·3	—	16·1	16·7	16·6	16·7	17·1	—
" 29	17·5	16·4	21·0	16·7	15·8	16·8	17·3	17·0	15·1
" 30	17·4	16·1	20·5	17·0	17·1	17·0	16·3	17·3	15·4
" 31	17·8	16·1	21·2	16·6	17·0	16·7	16·7	17·9	15·1
Average	17·24	16·4	20·935	16·7	16·57	16·8	16·75	17·25	15·5

INTERNAL GAS-FITTINGS.

By Mr. J. HALL, of St. Andrew's.

[A paper presented at the meeting of the North British Association of Gas Managers, Friday, July 13, 1877.]

The subject of internal gas-fittings, on which your committee have asked me to say a few words, is one I would not, of my own accord, have chosen; indeed, had I not been pressed, my position to-day would have been that of a listener and learner, not because I am averse to make known to others any little information I may have acquired, but from the fact that there are many here much more able to do justice to the subject than I am, and more accustomed to writing such papers. Besides, it is a subject that by some may be considered as outside our line of things, to interfere with the internal gas arrangements of public or private dwellings, which more directly belong to the architect and gas-fitter.

The only excuse for entering on this subject is the great trouble and annoyance we all, more or less, as gas managers, have with badly-laid gas-pipes, from the mansion to the commonest of our dwellings. Through small and badly-laid pipes in houses, gas consumers raise the outcry, "What bad gas we are getting! These gas people have the monopoly of supply, and it is time it was taken out of their hands"—which often means, hand it over to the local authorities; and this I am inclined to think in few cases would mend matters.

It is very surprising what an amount of ignorance there is with the general public regarding gas supply and gas consumption, even among directors of gas companies. It is not uncommon, when meeting in their manager's room, to hear one and another remark, "What grand gas you have here;" and the reply has been given, "Yes; who should have good gas if managers of gas-works have not? They prepare it specially for themselves." This remark has, to all appearance, often been received as if that really was the case, without ever thinking if such was at all practicable; but with that mysterious spirit called gas, nothing is thought by some too wonderful for it, unless to pass a meter without being measured.

The subject of gas companies having the control of the gas to the point of consumption has often been discussed, and, in my opinion, this plan is necessary for a close approach to perfection in gas supply. No matter how rich we make our gas, its difficulties often begin after it has passed the meter, and where we have no control. That this plan will work well there can be little doubt; and we find many towns in England of considerable size with no local gas-fitter, all such work being done by the gas company, who keep a sufficient staff of good workmen, and who, with the best materials and proper direction, make good work; and thus the company are able to give gas at the burner quite as good as that in the gasholder, besides adding very considerably to the profit of the company, the peace of mind of the manager, and the satisfaction of all concerned.

I have no doubt but that all connected with gas-works have, more or less, had much trouble and annoyance from water collecting in the pipes, and either causing a complete stoppage or an unsteady light, and this often, if not always, after the inspector has watered up the meter. This has led to a sort of grudge every time the meter is watered, or a demand for a dry meter, which, if not granted, has resulted in sending for a plumber to rectify what is wrong, which he does frequently by blowing through the pipes, without uncoupling the meter, and the consequence is that the water is displaced into the waste-box of the meter, resulting in a complaint at the gas company's office of a want of gas. This causes a journey and refilling of the meter so as to raise the float and allow gas to pass, and, after all, this expedient of the plumber, in blowing through the pipes, does not cure the evil, but only dislodges the water, causing it to wet the inside of the pipe, to be returned again with the action of the gas very shortly to its former place.

The collection of water in branch-pipes and mains is not altogether con-

fined to pipes laid horizontally, having too little fall upon them, but to branches from the ends of mains carried to a lower flat, and forming a tail to a horizontal main. By the way, I may add here that a dry meter is a cure for the evil complained of if it exists to a limited extent, for where gas has to pass through any considerable length of pipe, especially if the pipes are placed in the roof of the house, as many of them are, or in walls, condensation, independently of the little put down against wet meters, takes place even with dry meters, and I would advise that all dry meters should be connected to the side of the outlet-pipe, and not to the end, as is done with a wet meter, the pipe being carried down to the floor, so as to carry any condensed liquid past the meter, and never to the end of the service if under its level.

One would think that the laying of gas-pipes in dwellings is a very simple matter, and that a 40 years general use of gas in this country would have resulted in an intelligent staff of gas-fitters, able even to advise gas managers if required, and to execute their work in an intelligent and practical manner—in such a way, at least, as to save us all very much trouble; and if, in fitting up a house, we take as our guide the efficient manner in which our blood is sent from the heart to every part of our body, so that each part has its supply, more or less, as required, the work of giving quantity at least will be found easy, and a little thought and common sense will aid us as to quality, bearing in mind the many little things that affect it, bad burners not being the least. This, however, is not the case. Generally plumbers undertake the work, who have no special training for it. They are used to working among pipes, and can make a joint—in some cases nearly all they know about the work; indeed, 30 years ago I got better work than now. I remember once a whole land of houses, the property of, and fitted up by, the proprietor, a plumber, in such a manner as to induce me to refuse meters to some of them until altered; and further, I have seen a very large mansion fitted up by a plumber, of our chief city, which, after a few years use, had to be refitted nearly anew with gas-pipes, at great expense to the proprietor, and a terrible cutting up of the house. But the proprietor, to save himself further annoyance, must either consent to this expense or give up the use of gas in many of the rooms. Many workmen have an idea that it is a very simple matter to fit up a house with pipes, so much so as to think that it is enough to attach a branch pipe to a main at any point, without a coupling, or any provision being made for condensation of gas in the pipe being carried off, or getting at the pipe or joint to repair it, should it prove faulty, which is frequently the case, after a time, more readily than at first, even when the work is executed by careful and experienced workmen. It occurs in this way: The resin used in making a joint, especially if the workman's bolt is too cold, sometimes fills up the space which should be covered with solder; it appears tight for the time being, but the force of the gas tells upon it, blowing out the resin, and showing a very fine honeycombed joint, leaking, and requiring to be overlooked and repaired. Some gas engineers, chiefly in England, object to the use of unions, or couplings, on branch pipes, on account of their liability to get stopped up, the brass having an affinity for ammonia, and forming a solid substance at that point; but I think that where the gas is properly manufactured this objection is overbalanced by the convenience of being able to disconnect any branch at will. In making joints, great care is required, and no doubt many of you have in your experience seen very indifferent ones. We all like to see a neat, clean joint, and, in my opinion, to see this we must teach our gas-fitters more the use of the blowpipe, which, in England, is largely used for gas joints, and, if properly done, makes the strongest and neatest joint, always providing the pipe is of good quality. The mode of making this joint is simply by enlarging one end of the pipe, so as to take in the other, or "spigot and faucet;" put a bead of solder on it, and by applying, with blowpipe, the flame of a lamp or candle this bead is melted, and fills up the space intervening, thus making a solid, clean, and neat joint, without any fear of contracting the bore. Joints of all kinds, and in any position, can be made in this way; and for fixed joints in floors the workmen use, instead of beads of solder, very fine sticks, which run easily, and after sufficient solder is on the joint to make it good it is floated to any position with the blowpipe, a small mirror being placed under the joint to enable the workman to examine his work; so that, instead of the fire, bolt, and huge piece of solder, we have the spirit-lamp or candle, the blowpipe, and beads of solder. Gas-pipes are also carried along the face of walls to be covered with the plaster, preventing in all time coming any fault being remedied, unless by the breaking into, it may be, a papered or painted wall, which is done with great reluctance, and a grudge against the gas and all concerned with it.

I am sure you will not think I have overstated the results of bad gas-fitting, so far as proprietors and tenants of houses are concerned, nor the trouble and annoyance which managers of gas-works are subjected to, almost daily, on that account, nor yet the difficulty of getting properly qualified and experienced workmen to execute the work. You will also agree with me when I state a few of the difficulties which lie in the way, and prevent a remedy.

There has been an outcry that managers of gas-works should have the control of gas supply to the point of consumption, while virtually we only have it as far as the meter. However desirable the former position may be, few of us have the time to give to such work; and, besides, it would be encroaching on the architect's domain, whose duty it is to provide for all the requirements of a dwelling, and for which he is paid; besides, he has the means of carrying out so fully, having the plans of each floor all before him, the work of fixing each light in its proper place to suit the wishes of his employer. I admit all this, and yet architects fail in gas-fitting, I dare say because they consider it one of the minor details of a house, and if they give a specification at all, it is frequently a very general one, often specifying small pipes, to keep down the cost; and this evil is increased by the ruinous competition that takes place among tradesmen for the execution of the work.

Architects succeed in this department, as in all others, when they secure good tradesmen educated in their particular calling, taking a fair price for their work, and having regard to a good name, which is often to them great riches. First, then, to secure good gas-fitting, let us encourage good workmen for this department, by directing them in it as far as we have opportunity, letting them have a fair price for their labour and material, which in the end is the cheapest. A proprietor will forget what he considers a large account; but he will not forget the troubles and annoyances of bad joints and improperly laid pipes. Such workmen are to be found, and in spite of all the influences that are used in small communities to get work by any means, and the jealousies against those who dare to advise any particular workman, let us pursue the path which leads to success in this department of labour, as the best plans, unless carried out by skilful workmen, can only ensure partial success.

Next to skilful workmen, care should be taken that all the pipes throughout the house, from the service in the street to each individual burner, are of ample size—I should rather say, larger instead of smaller in diameter, than what we would consider sufficient. The additional cost is trifling, but the additional size adds very much to the success of the fittings. I do not specify any particular size, as this depends entirely on the character of the dwelling to be fitted up. (Much information may be got from Newbigging's "Handbook," no doubt known to most managers of gas-works.) I would say further, after a good-sized service, a full-way stopcock. Many of the stopcocks are very imperfectly cleaned out in the inside, causing at the very first a defect in the supply; therefore always use a full-way cock, or one a size larger than the pipe to be joined to it; and further, I would recommend the stopcock to be put on the end of the iron service, immediately on passing through the wall, and the lead pipe then joined on by a coupling or union. There is a very common plan of connecting meters to services, and I must say, though common, not good—that is, the gas company, on laying a service to a house, put on a brass cap immediately on getting through the wall. The gas-fitter comes, and as it is his place in many towns to supply the main-cock, instead of taking off the cap and screwing on a full-sized cock, he merely taps the cap, solders on a piece of compo, carries this to the meter wherever it is placed, and then fixes a cock, often very small, which destroys the supply, even before it reaches the meter. It is my opinion that the company should supply main-cocks, so that they get them the proper size, and placed on the end of their pipe; thus, in case of fire or damage to the lead pipe between the service and meter, they can shut off the gas, and prevent waste or accident. As the cost of brass cocks is considerable, iron cocks may be used, which are now made for the purpose, and used exclusively, I believe, by many large gas companies. Should the meter be at any distance from the service, another cock can be fixed at any convenient point nearer.

The position of the meter is one of some importance, and in large dwellings I should say, let it be as near the centre of the house as possible, and in the most convenient place for being watered, the gas turned off and on by the tenants, should they so wish it, and in an open place, so that any smell from it may be carried away. Next, let the main-pipe from the meter be carried direct to the attic flat, if there is one. When there is a roof space available for bell-wires and gas-pipes, as is frequently the case, I would say, carry the rising main at once to it, and then encircle the house on all sides with mains where the lights are to be, and from these mains drop a branch pipe for every light required.

These branch pipes to be $\frac{1}{4}$ inch, $\frac{3}{8}$ inch, and $\frac{1}{2}$ inch diameter, according to the number of lights they may be required to supply, not more than one light to be supplied from the $\frac{1}{4}$-inch pipe, and no pipe laid horizontally to be less than $\frac{1}{2}$ inch diameter. Even some gas-fitters of large experience doubt the propriety of ever using a less size of pipe than a $\frac{3}{8}$ inch for any purpose, and the $\frac{1}{4}$-inch pipe is to be avoided if we ever reduce our standard of luminosity, so that our fittings may not require enlarging. Each of these branch pipes should be attached to the top of the main, with proper brass couplings, and a short upward bend made on the pipe ere it is taken down. If these directions are carried out, each separate pipe may be uncoupled and taken out, if needful, not only to detect an escape of gas, but to put right anything found to be wrong.

All these main and other pipes that are lying horizontally must be laid on rinds of wood throughout their whole length, and fixed thereon with straps of lead, to keep them from injury by tradesmen and others working about the house; for if any of these pipes are pushed off the rinds it causes a depression below the line, and hence a deposit from condensation, and a flickering of the lights thereafter occurs.

In laying these mains, care must be taken that provision is made for carrying off all condensed liquid matter, by laying the pipes with a good inclination towards the meter, and at points where this cannot be obtained, introduce drip-boxes, larger or smaller, as the length of pipe intercepted may require. The pipes are joined to these boxes with couplings, close to the top edge, with the same upward inclination as the pipes. It is very desirable to use these drip-boxes freely, rather than run any risk of losing level with the mains, and it is also of great advantage, when suitable, to join the branches to top of the box rather than to the main. This not only prevents the supply of gas through the main being lessened by the insertion of a coupling, but the supply of gas is said to be improved to a branch from a drip-box instead of from a pipe. I may remark here that the character of a house, as to finish, has much to do with the condensing of gas in the pipes. If the pipes are laid in positions exposed to currents of cold air acting upon them, condensation is considerable; while, if laid in houses well-and closely deafened, little or no condensation takes place; but it is safe to provide for the worst by the foregoing means, or those fitted to prevent the evil.

If there is not a roof space where the mains can be laid, I would still lay them in the attic flat behind the coomb, if there is one; if not, I would lay them under the floors in such a manner as to carry out the foregoing general instructions. In this way the gas-fittings are confined chiefly to one flat, and as loose boards must be left at all couplings, they are confined to one floor, except those over lights to ceilings in rooms. And here, as to loose boards, let them be well fitted and screwed down, so as not to be rickety under the feet, nor difficult to take up when required. This, of itself, adds greatly to the facility for repairs, or additional lights being added, instead of having to lift carpets, &c., in good rooms; and when here, I may add that I have found it give great satisfaction to the occupiers of a house so to fit up the public rooms that, by having a stopcock at the side of the architrave of the door, all the lights in the room could be lowered down when leaving it for another, and put up again when the company returned. Here can be very successfully introduced a small by-pass, or a check, on the stopcock, to prevent the lights from being turned out altogether. This check, or by-pass, can be regulated so as to leave only a peep, as we call it, or sufficient light for servants to move about. This will be found very useful in fitting up railway stations which have arrival and departure platforms, only one being in use at a time; as also in theatres, halls, billiard-rooms, dining-rooms, drawing-rooms, &c.

One other matter I have not mentioned is the difficulty of carrying out these ideas when there are brick walls, down which pipes must be carried. In wood partitions there is no difficulty, neither is there any where brick walls are strapped; but when they are plastered upon the brick, the only plan is to cut a groove in the brick, and fix in a tube, so large as to allow the branch-pipe to be drawn through it, or screw a board over the groove so that the pipes can be got at when required, as is often done with hot or cold water pipes, and when we keep in view the convenience, it does not injure the look of the room so much.

In the lower flats of the better class houses, and in bath-rooms, w.c.'s., and pantries, I am not averse to the gas-pipes being fitted up on the face of the plaster, though there is no need for such being done; but in the case of workmen's houses, I am inclined to fit them all up on the face of the plaster, and use malleable iron tube for the same. Wrought-iron fittings can also be introduced with great advantage into houses of this class, as also stables, halls, and churches, of designs of no mean class, and they make a cheap and very durable fitting.

The practical outcome of these remarks on internal fittings is—

1. Let the pipes used be of a large size and good quality.
2. Employ only experienced tradesmen.
3. Concentrate the main-pipes into one floor, and lay them all on rinds of wood, with proper declivities to the meter or to drip-boxes.
4. Let each light have its own separate branch, not fixed, but capable of being pulled out for inspection or repair; and for the supply of a gas fire or stove, to secure success, always have a separate supply direct from the leading main, and not less than half an inch.

Allow no joint or connexion to be made without a coupling, and let

every coupling and each drip-box be accessible. I may here add that when the pipes throughout a house are large, giving a full supply of gas, then only can a governor be attached to the outlet-pipe from a meter with advantage.

One other matter, which is a great drawback to good gas-fitting, and a diminishing of the supply, is the small size that many of our manufacturers of gas-fittings make the drop-screws and inside tubes of chandeliers, a 5-light very rarely having more than a ¼-inch hydraulic tube, and that even often reduced at the lower end by solder. And here I may advise—though it has more to do with the purity of the gas and the better light therefrom, apart from the burner used, than gas-fitting—the periodical cleaning of all stopcocks at brackets and lustres, so as to free them from all grease accumulated at them and the jet socket, by lighting with tapers and candles—a very common practice with servants, &c. This, in my experience, has done much to secure a better light from the same gas than when they are left dirty and leaky.

And now, gentlemen, allowing that we have got our gas very near the point of consumption in a perfect state, there is still one point, and in many cases the fatal point—just as we are about to burst into brilliancy, the extinguisher is put on in the form of a bad or indifferently made burner. I do not intend to enter upon this subject, which is in itself a fair topic for discussion, but merely to recommend gas managers, when practicable, to keep a stock of good burners which they can supply to consumers at a low price should the gas-fitters in the locality not do so, trusting to natural consequences for recompense. Good accounts, paid without grudge, are sure to follow. Every gas manager knows a good burner, and the principle of a light-giving flame: get a burner which will give you a good supply of gas at a low pressure, and delivered so as to spread the flame and admit sufficient oxygen to consume the carbon.

Another point—simple, but a cause of much annoyance—and that is fixing the burner in the socket. Here our fittings are usually made to admit a turned socket burner or jet. In England this socket, as also the burner, is screwed; in either case a little white lead should be used, or if burners are changed periodically, as they ought to be, tallow will serve the same purpose equally as well; for if we admit air at this point, be the quantity never so small, our light is deteriorated in proportion to the quantity of air admitted, and this is no small quantity at times, as the flame has a tendency to suck in the air, and burners made in two parts should be examined for this air fissure, bearing in mind that a very small per cent. of air with our gas robs us of much of our light.

This paper, gentlemen, has been too long already, and, therefore, precludes me from saying more than a few words on the ventilation of rooms where gas is consumed. Most of you may have observed in the JOURNAL OF GAS LIGHTING the evidence given by various parties, witnesses in the famous sulphur trial (we in Scotland happily know nothing of such complaints, thanks to our 26 or 30 candle gas, which I hope may be retained to our credit, as well as to our comfort, as managers of gas-works), regarding the temperature of rooms in which gas is consumed, from the ceiling downwards to the floor. Though our position in this respect is also better than our neighbours (thanks, again, to our 26 or 30 candle gas), yet none of us who pay attention to rooms where gas is burned, and where considerable numbers meet, but will find them after a time get very close and uncomfortable. I do not enter upon this in a scientific manner, but merely wish to state what has been done to improve this state of matters, and thereby, along with proper gas-fitting, increase the luxury of gas illumination, and lessen some of the annoyances of gas managers. The best method of ventilating rooms, of which I have had any experience, is Rickett's, or Benham and Son's ventilating globe lights. These are generally, if not always, fitted with Argand burners in large globes or moons, open only at the top, and supplied with two tubes—one from the outside to supply the burner and room with fresh air, and the other tube placed over the top of the burner in the ceiling or hall, and taken under the floor into the chimney, or through the roof, so as to carry off the vitiated air. One of these lights will light a room 27 feet long by 17 feet wide, and the room remain quite fresh the whole evening, even when occupied by a large company. This, however, is an expensive method of fitting, and hence cannot be brought into every-day use. Next to this, and a little after the same system, is to have the centre flower in the ceiling over the chandelier with holes pierced through into a chamber formed under the floor above, and connected with the nearest chimney, or through the roof, by a tube from it. Generally it is left to the chinks in the windows and doors of the room to give a fresh air supply, unless a recent patent be used, whereby a supply of fresh air can be obtained to a room—also very simple and inexpensive—by carrying up in two or more corners of a room a tube of 4 or 5 inches diameter, as may be required, say, 7 or 7½ feet high. The lower end of this tube is open to the outer air, and the other end is open into the room, giving a supply of fresh air, which can be regulated at pleasure by a cover or valve on the tube. This, with one of the ventilators, to be afterwards mentioned, inserted into the chimney (some say even the usual fire will do, if it is in use), has been found to answer the end in view. The cold supply can be regulated at pleasure, and it is brought into the room above the heads of any of its occupants.

Another plan (one often used) is to insert in the chimney over the mantelpiece a cast-iron or zinc case, having an opening 9 by 4 inches, or 9 by 9 inches, as may be required. Attached on the inside of the cover of the case, and which cover is moveable, is a silk flap, so that it is easily lifted by the heated air from the room, passing into a going chimney, and as easily shut by any downward current in the vent, thus preventing smoke from coming into the room. When a 9-inch by 9-inch is used, the silk flap should be in two for the height. The flaps when narrow do not require to be lifted so high, and they also shut quicker from any downward blow than one would do. I may here add that in a large institution where the means used for ventilation were a failure—viz., openings made in the cornices of the large rooms, whereby the heated air found its way up behind the plaster, through the skirting-board of the room over, and thereby carried to one room what was injuring the salubrity of the room below—it was found also that these openings in the cornice occasionally allowed a down draught of cold air from the roof; and here I would say, never make an opening in a ceiling to carry off air, without connecting that opening with the outside air by a close air-tight tube. After fever had laid hold of the inmates of that institution, these ventilators were introduced into the vents of every room, and as most of the rooms entered from a long corridor, openings were made over each of the doors, and covered with perforated zinc, and this was found to add very much to the comfort of the rooms, especially the small ones, where fire and gas were used for long periods at a time.

Another plan strongly recommended is called the syphon ventilator. This can be fitted up in any room after it is finished as well as before, though in the latter case it is inserted under the plaster, and in the former it is formed on the face of the plaster, yet not by any means unsightly. It consists of a tube formed of timber or otherwise, and fixed on the face of the wall extending from the ceiling to the mantel-shelf, and at this latter point carried through into the vent. On the face of the tube, at or near the ceiling, an opening is made, in area about the size of the tube, it may be. On this is placed a piece of perforated zinc, to allow the heated air from the room to pass down the tube and up the chimney, the tube forming the short leg of the syphon, and the chimney forming the long leg, so says the author; but this I never could see, as the syphon is cut in two, and in practice I have not found it work very satisfactorily.

These plans for ventilating rooms are all simple and practical, and most of them inexpensive. They add much to the comfort of gas consumers, and I would recommend those managers of gas-works who have opportunity to try them for themselves.

And now, gentlemen, I must bring these very imperfect remarks to a close, as I fear I have not only drawn largely upon your patience, but only repeated what all of you know as well as I do, and, no doubt, could have explained much better; but a good story cannot be too often told, and if any of you have benefited in the least from any hint I have thrown out in these rambling remarks, I shall feel fully paid for the effort I made to come here to-day, and I beg to thank you, gentlemen, for your attention to my few remarks, knowing how tiresome it is for teachers to be taught.

WASTE OF GASLIGHT.

By Mr. G. BRAY, of Leeds.

[A paper read on Thursday, Aug. 2, before the Leeds Master Plumbers Association.]

The subject of waste of gaslight may, I think, be considered a new one. Waste of gas, by the use of bad gas-burners, has been, and is, a cry heard on all hands; but waste of gaslight is a child of the grumbler, which will have to wait some time yet, I suppose, before it arrives at vigorous manhood. Little as this fact in connexion with gas illumination is thought of, I feel no hesitation in saying that one-quarter of the whole of the gaslight produced in places of worship and public entertainment, as well as in private houses and mansions, is wasted. What does this involve? The amount paid for gas in England and Wales in the course of a year is, in round numbers, about £9,400,000. Two-thirds of this amount, being £6,266,000, I estimate will be the cost of lighting the places named above; one-fourth of the latter sum, or £1,566,000, is the amount which I say is thrown away, and might be entirely and easily economized.

Before proceeding to the consideration of how this waste takes place, and how to provide a remedy, we will first inquire, so far as is necessary for our purpose, as to what are the physical properties of light. I need scarcely say light is the medium by which everything that is beautiful (and ugly) in nature is seen. Unlike the air we breathe, or any other physical property in nature, light has one of the five senses exclusively to itself, and cannot be made the vehicle by which any of the other four senses can be affected. Light diffuses itself equally on all sides, from its source. Though not quite, but nearly so, in the case of a flat gas-flame, it is pretty well known that light lessens in intensity the further we remove from its source. Its law of diffusion is in the inverse ratio of the square of the distance—*i.e.*, the light lessens as the square of the distance increases from the source of light; or, to put it in another form, a gas-flame, throwing a given amount of light on an object at a distance of, say, 1 foot, will only throw one-quarter of the light on the same object if the distance be increased to 2 feet; if it be further increased to 4 feet, the light will be 16 times less; and so on as the square of the distance increases.

Light travels in straight lines from its source, and illuminates with greatest power objects upon which it falls with most directness. Objects upon which light falls obliquely will be illuminated in a diminishing degree, in proportion as the obliquity is increased. If a book be held on the same level, or above the source of light, as is the case in some public places of assembly, the angle the book is usually held at is such that none of the direct rays of light can fall upon it, and the person holding it is indebted for all the light he has to the light intercepted by his own person, and reflected on to his book by his white face and white linen, aided by the light diffused by the solid particles in the atmosphere. In these circumstances it is not unusual to see the audience or congregation turning round with their backs to the speaker, in order to get the advantage of direct light.

Light cannot be caught and *weighed*, but it can be caught and *reflected* in an almost endless variety of ways. It is the most pleasing subject of order with which I am acquainted, being prompt and straight in all its movements, and its actions being always above-board.

Light is also absorbed by the objects upon which it falls. A dull black object absorbs all the light thrown against it, and reflects none; and a white object reflects nearly all, and absorbs little; while absorption takes place in proportion as the colour varies between white and black. All coloured surfaces absorb light, and they do so in proportion as the shades are darker or lighter. A glazed surface always reflects more than a dull one of the same colour.

Having now explained sufficiently the properties of light to assist us in understanding what follows better than we could otherwise have done, I now proceed to show in what directions I think the great waste of light takes place. And first, the wall-papers and furnishings of our living-rooms and places of public resort have a great deal more to answer for in this respect than one person in twenty is aware of. It is no unusual thing for wall-papers to be used in dining and other rooms, and wall decorations in public places, which will absorb 90 per cent. of the light thrown against them, and only reflect 10 per cent. back into the room. Other papers are used which absorb not more than 15 per cent., and reflect back for further use 85 per cent.; but these are, strangely enough, put into places which are least used, such as drawing-rooms and bed-rooms. The difference between the dark paper, which absorbs 90 per cent. of the light, and the light paper, which absorbs only 15 per cent., is, you will see, 75 per cent.—against the dark one; but this does not represent the extra light which will be required to bring up the illumination of the darkly papered room to that of the lightly papered one, for this reason—a wall of the lightly papered room will reflect to the opposite wall 85 per cent. of the light it receives; 85 per cent. of this will again be reflected across the room, leaving 72 per cent. of the original light unabsorbed, after two contacts with the wall; and so the process goes on until the diffused light in the lightly papered room is increased to an amazing extent. In the darkly papered room 90 per cent. of the light is absorbed on its first contact with the wall, 10 per cent. only being reflected to the opposite wall; and after this second contact, one per cent. is all that remains of the original quantity, as compared with 72 per cent. in the lightly papered room. The above result will, of course, be interfered with by anything in the room which absorbs or reflects the light. Modern fashion does not permit me to illustrate this phase of my subject, in our better class houses, with the strongest contrasts I might draw, because in these houses it is now scarcely possible to find a living-room with four whitewashed walls and ceiling; but it may easily be seen how much less light your lightly papered drawing-rooms take to illuminate them than your dark papered dining-rooms. There are hundreds—I had almost said thousands—of expensively papered dining-rooms in Leeds which are worse lighted with their three, four, or five-light chandeliers than are most of our whitewashed cottage kitchens with their one naked flame. This light-absorbing power of coloured surfaces will explain, to a great extent, why we have so many dark corners in our homes and places of public assembly. It will also explain why a large room can be lighted with a much smaller number of lights, in proportion to its area, than are usually required for small ones.

In order that you may better understand what coloured surfaces will do in the way of absorbing light, I have made some experiments with wall-papers, the results of which I have put in table No. 1, and I will read them to you; and here are the samples of the wall-paper I experimented with:—

TABLE No. 1.

	Unglazed White Paper.	Very Light Drab; about Half of Pattern Dull, and Half Glazed.	Half Dull Light Grey, and Half Dull Yellowish White.	Very Light Dull Green, and Light Glazed Green.	Glazed Drab Ground, mostly covered with Dull Light Brown Figure.	Dull Brown Ground, with Dull Black and Gilt Pattern.	Dark Red Ground, with Black Leaf Pattern edged with Gold. All Dull.	Dead Black.
Reflects per cent.	91	85	78	39	39	12	9	—
Absorbs per cent.	6	15	22	61	61	88	91	100

The different light-absorbing powers of these papers I can *practically* illustrate by the little apparatus before me, though we cannot by it gauge the result with scientific accuracy. It is a box having two compartments of the same size, representing two rooms, and open at the front. In the centre of each I have placed a gas-burner, each consuming the same amount of gas, and giving the same illuminating power within one per cent. One compartment, you observe, is lined with unglazed black paper, the other with unglazed white paper. At the bottom of each box I have placed a card with various sizes of printing on. You will readily see by this experiment that a much greater amount of light is absorbed in the black papered box than in the white papered one; and as I change the linings you will also readily see the difference between the white and other wall papers with which I contrast it.

These little experiments not only show the extent, but the contrasts being shown side by side, serve to impress one's mind with the facts more strongly than is done by ordinary every-day observation without the contrasts. If these facts and these contrasts could not only be laid before the Leeds master plumbers, but also before our architects, decorators, and the public, I cannot doubt that some of the colour, which is now laid on so thick, would be used with a more sparing hand. It is pitiable to see the colour of the walls and furnishings in some of the hemmed-in places in London, where, from the grotesque positions in which you find the windows, you see that light is their great desideratum.

I am not a stoic in the matter of colour—I rather delight in it—but I like it in its proper place. When decorative effect is required, which can only be produced by the use of dark colours, I believe in making use of them without stint. But where light and cheerfulness are counted of value, light colours should be the rule, and that this admits of elegance of design, our drawing-room decorations abundantly prove. Of course, in all the features I have mentioned, and have to mention, taste will properly play a leading part; but taste will be regulated to advantage by having the facts connected with utility to guide it, and these facts should never be left out of consideration when a room is about to be papered or furnished, or when the lighting of a public building is about to be arranged for.

In pursuing the consideration of the question still further, we will next see what is done in lighting matters in some of our places of public resort. I have obtained some particulars, which I have put in Table No. 2, of the lighting arrangements of St. George's Church, Oxford Place and East Parade Chapels, and the Victoria Hall, Leeds. I have taken these as samples, because they are all well-known places, and in the centre of the town. The lighting arrangements are not worse—in the places of worship, at all events—than the average of such places, yet we shall find something to improve in all of them. The particulars in the table refer to the number of sittings, the number of burners used, and the gas consumed per hour for each place.

I mention the number of sittings instead of the floor area to be lighted, because I could more easily get at the former. The sitting space allowed is about the same in all the places of worship, except in the gallery of Oxford Place Chapel, where the space is somewhat less. In Oxford Place and East Parade Chapels, the total area to be lighted is very much larger than, and in St. George's Church quite as large as, the Victoria Hall. The particulars are as follows:—

TABLE No. 2.

	Sittings Lighted.	Burners Used.	Gas Consumed per Hour. Cubic Feet.
Oxford Place Chapel . .	2200	73	About 292
East Parade Chapel. . .	1865	99	About 396
Saint George's Church. .	1366	238	About 714
Victoria Hall	2000	1230	4000

In this table, in speaking of the number of cubic feet of gas per hour used to light each of the places of worship, I use the word "about," and I do so because it is a difficult matter to get at the exact consumption, as in all cases, except the Victoria Hall, other rooms were supplied from the same meter which supplied the church or chapel. In the Victoria Hall it is different, as there the consumption is taken by meters used only for that purpose, and the result given is what is actually consumed. In the church and chapels the burners were Bray's No. 4; in the Victoria Hall I think they are No. 3, but I could not get up to the chandeliers to see the size. The consumption in these places, as you will see, varies immensely. St. George's Church is splendidly lighted—to excess, I think—though it will require more gas to light it efficiently than either of the two chapels mentioned, because of its very dark-coloured walls and ceiling. To have them painted in this way is, of course, a matter of taste, which, in this case, I shall not attempt to argue against. The lights are well distributed, but I cannot say that I approve of the system of lighting.

Oxford Place Chapel is dimly lighted, and well it may be, with a consumption of 292 feet of gas per hour for 2200 sittings. The gas-jets are on the top of pillars rising from the pews, and are 6 feet 6 inches high in the body of the chapel, and 6 feet in the gallery. The lights in the body are well distributed, but badly distributed among the side pews in the gallery. There the top tier of lights is fixed three pews down, and instead of the light from these falling upon the books of those sitting in the top pews, it shoots into their eyes, and in sitting through a service the people in these pews are almost blinded, because of the lights intervening between them and their view of the preacher.

The alteration I would suggest here, regarding the position of the lights, is, that the pillar-jets, in the gallery above alluded to, should be removed to the front of the top pews, and that the pillars throughout the chapel should be raised to a height of 7 feet from the floor, so as to allow the light to fall more directly on the books of the congregation, and, at the same time, be more comfortable to the eyes than is possible where the gas-jets approach the same level as the eyes.

Though 292 feet of gas per hour is all the congregation are allowed for lighting purposes, the small amount of light yielded by this is considerably diminished by covering the flame with a globe, and that, too, of a very objectionable kind. It is of a form which keeps the flame in a constant dance; and just where the greatest amount of light should be allowed to pass through for the use of the congregation, a broad ground ring on the globe intervenes between the flame and the people, and the congregation may be seen working about to get into the most favourable line of light. These globes will keep from the congregation not less than 25 per cent. of the light they would receive if the globes were removed, and they distribute the light very irregularly.

Lighting by pillar-jets—the principle adopted in this chapel—can be made to give light to a congregation more economically than any other system I am acquainted with; but the principle carries with it, when the best is made of it, the grave fault of placing too many points of light in the line of view of those sitting in the pews farthest from the pulpit, and this fault more than outweighs the slight economical advantage it possesses over what I consider to be the best system, which I shall speak of presently. As applied in Oxford Place chapel, the principle there used is not carried out to the best advantage, as I have before indicated.

In East Parade Chapel is consumed 396 feet of gas per hour for 1865 sittings. For this consumption of 16-candle gas, with naked flames, a place of worship of this size, and with the same coloured furnishings, may be efficiently lighted. The principle of lighting here adopted, if properly carried out, has fewer defects, in proportion to its advantages, than any system I know of. The light is only slightly less economically used than by the Oxford Place Chapel system, but the noticeable defects of that system are all removed. It is the Oxford Place system, used to a point where its defects would begin, and another system is there introduced which avoids the former's defects. The eyes of those sitting in the back pews of chapels lighted like Oxford Place is, become dazzled by having to run the gauntlet of too many points of light before getting a view of the preacher; whereas, with the mixed East Parade system, all the central pillar lights are removed, thereby giving the congregation an uninterrupted view of the preacher and of each other; the latter being, I am sure, no despisable advantage to the fairer portion of a congregation.

Though this is the best system to which I can direct your attention for lighting a place of worship of this description, yet it can be improperly carried out, as you may suppose. I will briefly describe the arrangement. The seats farthest away from the pulpit, in the bottom, are lighted with pillar jets, which rise from the pews. The seats farthest away in front of the pulpit, in the gallery, are lighted with two small star-lights, hung from the roof, and fixed in a good position for their purpose. The inner circle of pews at the bottom and top, including the whole of the gallery side pews, receive their light from a large star, hung from the roof, over the centre of the opening in the gallery. This central star should be considered the leader of this system of lighting, and should be properly supported by the auxiliary lights, but to some extent this is not done here. The central star gives more than sufficient light to the people, in the inner circle at the bottom, and in the gallery, but the two top tiers of pews on either side of the gallery are miserably lighted. The excess of light, which those in the central parts would rather be without, is worse than useless to the upper side tiers of pews, because the central star-light is hung so low (a little too low, I think), that the light therefrom shoots into the people's faces, and over the tops of their books, instead of falling upon them. The result is seen by the congregation in these pews turning their backs on their respected pastor, in order, for the moment, to get the light they require from another source. These defects are not at all connected with the system. What is wanted to remove this defect is, that pillar-jets, or jets hanging from the ceiling, should be provided in the neighbourhood of the upper side pews in question.

The Victoria Hall, Leeds, is the last illustration I shall give on this branch of my subject, and it will serve to show better than anything I can instance in Leeds how to spend money in wasting gaslight. This hall, as you may be aware, is lighted by two chandeliers on the orchestra, and ten chandeliers in the body of the hall. You will probably not be aware of the number of burners in use; I will, therefore, give them. The orchestra chandeliers have 130 for the two; those in the hall have 110 each, being 1100 for the ten; these, with the 130 before mentioned, give 1230. The hall will seat, with the enlarged orchestra, 2000 people, so that you see we have 1230 gas-jets, consuming 4000 feet of gas per hour, used to give light to 2000 people; while the jets in East Parade Chapel give quite as much light in the aggregate to the people as is given to those in the Victoria Hall, and this is done with a consumption of 396 feet of gas per hour, consumed by 99 burners. To put it in another way, the people in East Parade Chapel may be properly lighted, with the slight alterations I have mentioned, with a consumption of 21 feet of gas per hour per hundred people, while those assembled in the Victoria Hall have spent upon them 200 feet per hour for every 100, with no more light. I sometimes imagine what a sight the floor of the Victoria Hall would present if the 1230 gas-jets were distributed among a 2000 audience. The hall would be in a perfect blaze. There would be sufficient light, if properly used, to light all the people from their homes to the hall, give them light while there, light them home again, and have plenty to spare to take them to bed. This is simply a scandalous waste of gaslight, and when architects go so far astray as in this case, I should like the gas-fitters of Leeds—or any other town—to be able to put them straight. The cause of the waste is perfectly clear.

The chandeliers are raised so high as to give one the impression that they are intended to illuminate the heavens, rather than the poor mortals, who have paid to be amused or instructed, on the floor of the hall. The chandeliers being placed so high is one reason why so much gas shows so poor a result; but the main reason is, that three-fourths of the burners are so placed as to produce no appreciable illumination on the audience. As you will be aware, the chandeliers are shaped something like a bell-pear, hung as the pear grows, and are mainly composed of glass. The lights are arranged round two circles of glass dishes, the top circle being composed of five dishes, round each of which are fixed six burners, the lower circle being composed of ten dishes, round each of which are fixed eight burners. All the inside lights only serve the purpose of illuminating the chandelier, which is so dense as to possess neither reflective nor refractive power, which is of much use for transmitting the light to the audience. The lower interior lights, in addition to being useless in the position in which the chandeliers are placed for giving light to the audience, shoot their products of combustion up to the lights above, and keep them in one incessant dance. It will require no argument of mine to convince any one that lights interfered with in this way by a spent atmosphere cannot be doing their duty as illuminating agents. The chandeliers being placed close to the wall, and within recesses formed by the columns supporting the roof, one-half of the whole of the light which might be made available from them is wasted on the dark wall and pillars, which absorb the light, and from which scarcely any is thrown down upon the audience.

I think great liberty should be allowed to architects in embellishing a hall like this, but the liberty should not be allowed to run mad, as it has done in this case. These same chandeliers might be used in the same positions they are now in, and yet save nearly half the gas they consume, at the

same time giving as much light, and a great improvement in effect. It may be done in this way: I would stop off the inner half of the lights (400 of them, which are never seen) which surround the lower tier of dishes. The products of combustion from these would not then disturb the lights above, and their dancing would cease; the top lights would then develope their illuminating power, and show themselves steadily and effectively to the audience. I would also bring out the chandeliers a foot farther from between the pillars, which would bring into use many of the lights which are now kept out of sight, which, besides giving more light, would show the chandeliers off to better advantage. That these results would follow these altertaions I do not think any gentleman before me will doubt. Thus, we see that much may be done with a proper use of our material, without marring, in any sense, the designs of our artists. In passing from this subject, I may just venture the statement that if five of these chandeliers were hung down the centre of the hall, though, perhaps not looking so well architecturally, it would be more efficiently lighted than it is now; and I know sufficient of the science of acoustics to give a confident opinion that the acoustic properties of the hall would be immensely improved thereby.

I might mention other public places of resort wherein gas is allowed to flare away, and the light it produces wasted, as if it were a thing as costless as the air we breathe; but this is not necessary, and I will pass on, and, entering the houses of both the great and lowly, we shall find that waste of gaslight is as freely indulged in there as in the places I have before alluded to.

Here, almost at the very threshold, we are met with burners ill adapted to the purposes they have to serve, and it is a difficult matter, seeing the waste of gas that is going on, to pass them by, and, in order to keep to our subject, deal with the waste of gaslight, which, it is important we should bear in mind, is the subject we have to-night in hand.

In all our arrangements for lighting up the rooms we live in, it is important to bear in mind the principle before mentioned—that the power of light diminishes, not simply in the same ratio as the distance increases, but in the greater ratio of the square of the distance; therefore, all the lights in a house should be placed as near as possible to the objects they have to serve, and I need not say should not be placed under a bushel.

(To be continued.)

DEATH FROM SUFFOCATION BY GAS, AND CHARGE OF CULPABLE HOMICIDE AGAINST A GAS INSPECTOR.

On the 15th ult. a very distressing occurrence was brought to light at Port Glasgow, which has caused a considerable amount of excitement in that town, and has since led to the apprehension of a gas inspector on the charge of culpable homicide. A widow woman, named Elizabeth Ritchie, or Lang, aged 64, who resided in the upper flat of a property owned by herself in Ropework Lane, Port Glasgow, was found, by her brother-in-law, William Reid, about seven o'clock on the morning of the 15th ult., lying dead on the floor of one of the rooms of the house. The dwelling-house consists of three apartments. The room in which the deceased slept faces the lane, the kitchen is in the centre, and the other apartment, in which the brother-in-law slept, is in the opposite end of the house. On getting up in the morning he proceeded to the kitchen, as was his custom, to light the fire, when he saw Mrs. Lang lying on the floor of her room. He perceived a smell of gas, but felt no injury from it. Dr. Crawford was at once sent for, but on making an examination of the body he concluded that death had occurred some hours previously. Police-superintendent Sloan, who was informed of the matter, proceeded to the house, and on examination he found the gas turned off at the meter (which was in the room where the deceased slept), but the outlet-pipe was uncoupled.

It is stated that an escape of gas had been felt in the house from the previous Wednesday, when the meter was watered by Patrick M'Crindle, a plumber, who was employed as inspector of gas-meters by the Gas Committee of the Town Council. It is supposed that at dark Mrs. Lang must have turned on the gas, which would soon have filled the small apartment, and that before she went to bed she had turned off the gas at the meter, and then gone and lifted the window partly up (it being found in that position), and immediately dropped down on the floor suffocated. A *post mortem* examination of the body was subsequently made by two surgeons, and an official investigation of the matter was at once made.

Acting on instructions from the Crown authorities, the Renfrewshire County Police apprehended M'Crindle on Saturday forenoon, on a charge of culpable homicide or culpable violation or neglect of duty, which resulted in the death of Mrs. Lang from the inhalation of gas. After being examined before the sheriff-substitute, at Greenock, M'Crindle was admitted to bail.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

In some respects the prevailing uncertainty as to what may be the result of the present antagonistic positions of the coalowners and their men is awkward and embarrassing, but in other respects it has as yet made but little change. The colliery proprietors seem determined to proceed with their notice for a general reduction in wages, and the miners, on their side, say they cannot possibly agree to it, so that a dispute appears inevitable. A conference, however, has been opened between the two parties, and there may be some, as yet invisible, middle course, by the adoption of which trouble may be averted. Should a strike take place and be prolonged, a good deal of inconvenience would necessarily be suffered by the iron, steel, and other manufacturers.

The iron trade has undergone no particular change during the week, save that some of the brands of Yorkshire and Derbyshire pig iron have been rather weaker, in consequence of the dulness of the Scotch market, and the steady growth of stocks in all directions. During the last day or two a few sales of foundry pig are reported to have been made on local account, and two or three of the leading Derbyshire smelters are sending a fair tonnage into Staffordshire and Lancashire, at prices which seem to compete successfully with those of the local producers.

In finished iron, too, the last few days have brought indications of a forthcoming drop in prices, which will doubtless at once ensue as soon as the question of the miners wages has been so far disposed of, as to allow of the price of coal being lowered. Merchant bars at present range from £6 to £8 per ton.

At the leading brass manufactories of Sheffield and Rotherham there is a fair amount of work in course of execution, but not any pressure. Two or three of these houses report themselves pretty well off in gas-fittings production, whilst the largest firm in the trade in this district is turning out good lots of hydrants, meters, fire-cocks, bib and ball taps, and other water-fittings. The demand is mostly for London and the leading English towns.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There are still a good many contracts for gas coal in the market which are not yet settled, and there are also a few fresh inquiries for this class of fuel; but trade continues very dull, and although, so far as current quotations are concerned, there is no material alteration upon the rates last given, low prices have still to be quoted to effect sales, and the very little anxiety which consumers display to secure their winter stocks is an indication that they at least do not anticipate any upward movement in the market for the present. In other classes of round coal there is also very little doing. For house fire purposes the demand is still extremely limited, and with the continued depression in the iron trade common classes of coal are very difficult to move, and are a complete drug in the market. Burgy and slack are more plentiful than they were, the recent wet weather, by putting a stop to brickmaking operations, and the prospect of a strike at the Bolton cotton-mills, having a tendency to diminish the demand for these classes of fuel. Pit prices may be given about as under:—Good Arley, 10s. per ton; inferior descriptions, 8s. 6d. to 9s.; Pemberton four-feet, 8s. to 8s. 6d.; common coal, 6s. to 7s.; burgy, 5s. to 5s. 6d.; and slack, 3s. 6d. to 4s. 6d. per ton.

In the shipping trade, although perhaps matters are not quite so bad as they were a month or two back, there is still very little doing, and the prices taken in the market are low.

The demand for all classes of iron is extremely small, and if prices are no lower it is more because sellers are not in a position to take less money than on account of any firmness in the market. The local makers of pig iron are securing little or nothing in the shape of new business, even at the reduced list rates reported last week, as they are still undersold by north country iron, the relative prices for delivery into the Manchester district being about as under:—Lancashire No. 3 foundry, 53s. per ton; No. 4 forge, 52s. per ton, less 2½ per cent.; and Middlesbrough No. 3 foundry, 48s. 9d.; No. 4 foundry, 48s. 3d.; and No. 4 forge, 47s. 9d. per ton, net cash. In the finished iron trade one or two shipping orders have been recently given out, but the home demand is still exceedingly small, and very few of the works are running more than three or four days a week. Quotations for delivery into the Manchester district remain at £6 10s. per ton for Middlesbrough bars, £6 12s. 6d. for Lancashire, and £6 15s. for Staffordshire ditto.

THE COAL AND GENERAL TRADE OF THE NORTH.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the North was quieter last week. September opens with not at all a satisfactory prospect for autumn business. Merchants and gas companies, tempted by low prices and small freights, have laid in considerable stocks during the summer, and there is no special demand anywhere. Under these circumstances all kinds of gas coals have been a little weak in the market, and, in some instances, they have had to yield a trifle to make business. The principal transactions which have occurred have been at something like 7s. per ton net, with only a quiet demand. This may be accounted for, however, by the fact that a considerable fleet of laden vessels were at sea, and there was a disinclination to give fresh orders until they had arrived at the port of delivery. Inferior gas coals do not alter much from about 6s. per ton. The main trade done in steam coals is at about 11s. 3d. per ton net, which is also a slight reduction upon recent quotations; though at the same time the leading collieries quote 12s. 6d., less 2½; but it is quite certain that the principal trade that is transacted is at the former, and not at the latter, figure. House coals range from 12s. 6d. down to 10s. Coke is lower, and somewhat difficult to sell. Inferior coals are just as much a drug in the market as ever, and there are disputes between the men employed at some of those pits and the employers about the price of working.

Mr. Herschell, Q.C., the umpire, has decided that there shall be no reduction in the wages of the Northumberland pitmen.

There is an abundance of tonnage in the coal ports. They include a good few seeking ships, and it is not likely that they will be all fixed for a week or ten days. Coasting rates are, therefore, down about 5s. per keel. The Baltic shipping business is the worst on record this year. Outward rates for steamers to Cronstadt are £4 10s. per keel. Business at the time to Cronstadt used to be considered very poor at this time of the year at £8 per keel. Now the rates are hardly half that. Trade with the Mediterranean is also dreadfully dull, with no orders of any value in the market. Gas coals are being sent out to Boston, U.S., at a freight of about 7s. per ton. The iron trade of the North is pretty much where it has been all the year, and that is about as depressed and dull as it can well be. The manufacturers have great difficulty in establishing a margin of profit upon their transactions, and there are likely to be a good few financial troubles in the winter if fighting does not cease in the East. The chemical trade was dull last week. The recent "spurt" was clearly owing to "bulling" transactions. They failed, however, and the trade is pretty much where it was.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

At a meeting of the Pollokshaws Gas Company, held on the evening of Monday, the 27th ultimo, Mr. John Adam, gas manager, Kirriemuir, was appointed manager and collector of rates, in the room of Mr. A. Simpson, resigned. There were about 60 applicants for the office.

The Milngavie Gas Company have intimated to the convener of the committee appointed some time ago, at the public meeting held to protest against meter-rents being charged, that, after due consideration, they still intend to impose the charge. Another public meeting of the gas consumers has been called to consider what further action should be adopted under the circumstances.

At a recent meeting of the Police Commissioners of Langholm, Mr. J. Thomson, convener of the Lighting Committee, reported the result of that committee's interview with the directors of the gas company. He stated that 23 of the street-lamps were the property of the commissioners, and that the remainder belonged to the gas company. He further stated that the gas company were willing to buy the commissioners lamps for £20, and they guaranteed to keep the whole of the lamps in a thorough state of repair for £5 per annum. The offer was agreed to.

The question of charging meter-rents by the Town Council of Kilmarnock is still exciting a good deal of interest among the gas consumers of that town, and it is now stated that there is a probability of the abolition of the charges being made the basis of an agitation with some of those persons who may seek civic honours at the forthcoming municipal election. There is no doubt that the abolition of the meter-rents will be demanded by the *vox populi*, but there are also many persons who admit that the levying of a charge for the use of meters is a practice that can be defended on several grounds with the utmost propriety.

The Ayr and Newton Gas Company, whose shares realize 6 per cent. dividends, recently issued £1000 worth of additional stock for past extension of the works. The stock was offered to the shareholders, in proportion to the number of shares each held at par, which was £2 per share. After the shares had been pretty freely taken up, there still remained 85 shares, which were disposed of in 17 lots of five shares each by public auction last Tuesday, when they all went readily off, one lot bringing 9s., and all the rest 8s. premium per share.

By way of supplement to what I mentioned some time ago regarding

the street lighting of Aberdeen, I may now state that since the beginning of the lamplighting season, 2185 lamps have been lighted in the city each night. This includes 54 lamps at the harbour. The removal of the lamps from the railings in a number of the streets, and placing them at the edge of the pavement, has been a somewhat expensive process, and the projected improvements are not yet completed. A petition from 18 of the lamplighters for an increase of wages has been remitted to the Watching, Lighting, and Fires Committee for consideration.

The seventh ordinary general meeting of the Partick, Hillhead, and Maryhill Gas Company was held in Glasgow on Tuesday, the 28th ult.—Mr. Henry Cowan, chairman of the company, presiding. The report of the directors, which was held as read, included the following:—"The accounts for the year ended June 30 last, as certified by the auditor, show a net profit of £4653 16s. 9d., which, with £763 19s. 2d. undivided last year, makes a total amount available for dividends of £5417 15s. 11d. The directors recommend that the following dividends be declared for the year—namely, 5½ per cent. upon the preference shares, less income-tax, and 4 per cent. upon the ordinary shares, free of income-tax, both payable on the 2nd of October next; that the sum of £200 be carried to a depreciation account, and that the balance be carried forward to the credit of this year's account. The directors have much pleasure in being able to report that the business of the company is steadily increasing, there being 7772 meters now in use. During the past year, 8862 yards of new mains have been laid to meet the requirements of the rapidly increasing districts of New Kilpatrick and Knightswood, and of extended streets in other localities. At present only a few yards of pipes are needed, and unless the building trade revives, very little will be required during this year. The principal charge against capital for the next twelve months will be the additional gasholder, which, if the weather keep favourable, should be completed during next month. The present retort power will be sufficient for some years, and all the other parts of the works are in the most efficient condition." On the motion of the chairman, seconded by Mr. A. H. Maclean, vice-chairman, the report was adopted; and the directorate was afterwards reconstituted. In the course of his speech, the chairman remarked that the anticipations held out last year had been so far realized, to such an extent, indeed, that the directors were now able to pay a larger dividend. The consumption of gas had not increased to the extent expected, but he trusted that in future years it would go on increasing. Last year the directors stated that they would require to contract for a new gasholder, at a cost of about £5000; and he was glad to say that, owing to the cheaper rate of iron, and material of that description, they had been able to contract for the holder at a lower price than had been anticipated. In the course of eight days the holder would be finished.

Dr. Wallace's report on the quality of Glasgow gas, for the week ending the 25th of August, states that the average illuminating power ranged from 25·96 candles to 26·84 candles, and the maximum from 26·00 candles to 28·62 candles. The lowest minimum was 25·89 candles. At a recent meeting of the Gas Committee's Works Sub-Committee the question of the low illuminating power, sometimes reported by Dr. Wallace, was under consideration, in consequence of a letter upon that subject having been received from the town-clerk, at the instigation of the magistrates of the city. The requisite action was recommended by the sub-committee.

At a meeting of the new Water Commission for Perth, held on the evening of Friday week, a letter was read from Mr. Bateman, London, offering to act as engineer for the works to be constructed under the new Act at a per centage of 7½. Mr. Bateman asked liberty to engage Mr. John Young, C.E., Perth, but the Commission resolved to intimate that Mr. Bateman must be alone responsible for the execution of the work, and make any arrangements he likes.

The Carluke Local Authority have agreed to assess, for the purpose of their special drainage works, at 3d. per pound, if it can be levied, on the gross rental of £8500, or 4d. per pound, if under deductions.

The sum of £1045 has already been expended on the new drainage works in the western division of the town of Montrose.

A return has just been issued in connexion with the water supply of Edinburgh, which indicates that the whole of the five reservoirs are full of water, the total quantity in stock being 700,678,753 gallons, as compared with 329,722,918 gallons at the corresponding date last year. The total a fortnight ago was 666,917,320 gallons, so that there has been an increase of 33,761,433 gallons during that time. The delivery in Edinburgh has been at the rate of 31·28 gallons per head per day to a population of 286,800. The rainfall at Glencorse from the 1st of January to the 28th of August has been 40·40 inches; for the same period in 1876, 24·40 inches; and in 1875, 20 inches; 8·45 inches of rain fell at Glencorse last month.

The rainfall for the month of August at St. Andrew's was 7·64 inches, whereas, in the whole of the year 1875, it was only about 22 inches. During the past eight months the total rainfall has been 26·26 inches. Only two of the days in the past month were entirely without rain.

Since last report there has been considerable flatness in the Glasgow pig iron market, and prices have been down at 54s. 3½d to 54s. 4½d. cash, and 54s. 6d. one month open.

There is no change to report in the coal market, and prices have still a downward tendency.

Portsmouth Water-Works Company.—It is stated that the directors of this company have declined an offer of the corporation to purchase their property, the latter guaranteeing the shareholders annuities equal to 9 per cent. on the capital invested.

Wrexham Gaslight Company.—The annual meeting of this company was held on the 28th ult., when full maximum dividends for the past year were declared, also a back dividend of 2 per cent. for the year 1873. The price of gas was reduced from 4s. to 3s. 9d. per 1000 feet.

Presentation to Mr. Thomas Moore.—On Wednesday, the 22nd ult., Mr. Thomas Moore, who recently received the appointment of manager of the Macclesfield Corporation Gas-Works, was presented with a valuable timepiece by the officers and workmen of the Stafford Gas-Works, with whom he had been for several years associated. The presentation was made at the board-room of the works.

Taunton Water-Works Company.—An extraordinary general meeting of shareholders was held on the 22nd ult.—Mr. Badcock in the chair. The report and balance-sheet were taken as read; and it was explained that, after paying a dividend at the rate of 5 per cent. on the share capital, there would be a balance in hand of £350, which was retained for any contingency which might occur in the liquidation of the affairs of the company, whose works will shortly be transferred to the town council.

Public Lighting at Howden.—The annual meeting of the ratepayers of Howden, under the Lighting and Watching Act, was held on the 17th ult. The accounts of the gas inspectors were presented, showing a balance in hand of £18 12s. A call of £160 was resolved to be made on the overseers for lighting the town for the ensuing year. It was stated that £10 would be allowed by the gas directors as compensation to the ratepayers for being without gas in the streets during the floods in January, when the gas-works were flooded, and the town was in darkness for eleven days. The retiring gas inspectors (Mr. Gregory Young and Mr. T. C. Turton) were unanimously re-elected.

Tunbridge Wells New Gas-Works.—The directors of the Tunbridge Wells Gas Company, at their meeting on Monday, the 27th ult., opened the following tenders for the erection of a retort-house, coal-store, clock tower, meter-proving room, station-meter house, photometer and experiment rooms, and other buildings, exclusive of the ironwork of the roofs of the several buildings, as designed for the company by Mr. R. P. Spice, of Parliament Street, and accepted the lowest:—Messrs. Willicombe and Oakley, Tunbridge Wells, £13,113; Mr. R. C. Trimm, Hersham, Surrey, £12,990; Mr. J. Perigoe, Tunbridge Wells, £12,481; Messrs. J. Punnett and Sons, Tunbridge, £12,416; Mr. Henry Potter, Stepney, £11,550. The quantities were taken out by Mr. Thomas Ladds, architect and surveyor, Tunbridge Wells.

Neath Water-Works Company.—The ordinary general meeting was held on the 29th ult., at the office, Queen Anne's Gate, Westminster. The report stated that, in accordance with the resolutions passed by the proprietors at special meetings, held February 28 last, dividend warrants would be forwarded to the shareholders of the Neath undertaking at the rate of 10 per cent. per annum. The supply of water to Neath and Briton Ferry, supplied through filter beds at Neath, was giving general satisfaction, and during the past year above a hundred new services had been laid on. The great depression of trade at Neath and its neighbourhood had caused a diminution of receipts for the supply of water by meter for trade purposes, and the Local Board of Briton Ferry had not yet completed the requisition for laying on the whole supply of water to be provided. It was announced that the directors were taking steps to reduce the rate of interest upon the 5 per cent. mortgage bonds as they might become due. The report having been adopted, the retiring directors and auditor were re-elected. The meeting having been made special, authority was given to sanction the raising of additional capital, by shares and by debenture stock, under the powers of the Neath Water Order, 1876.

Newport (Mon.) Gas Company.—The half-yearly meeting of shareholders was held on the 13th ult.—Mr. Gratrex in the chair. The report of the directors showed that the receipts for the half year amounted to £9302 1s., and the expenditure to £6457 11s. 4d., leaving the sum of £2844 9s. 8d. available for dividend. The works and extension referred to in previous reports had been completed. The Bill promoted in Parliament during last session for acquiring additional land had received the Royal Assent. The directors recommended the payment of the usual dividends on the A and B shares. The chairman moved the adoption of the report, which was seconded by Mr. Phillips, who made some remarks as to the satisfactory condition of their property. Whilst their first care was to protect the interests of their shareholders, their next care was the interest of their customers, to whom they resolved to give the best quality of gas for the lowest possible price. The report having been adopted, the dividends recommended in the report were declared, and the retiring directors and auditor re-elected. The proceedings closed with a vote of thanks to the board and the chairman.

Underground Water.—The Committee of the British Association for investigating the circulation of underground water in the new red and permean rocks have been reappointed, and the inquiry extended to the oolites. The honorary secretary, Mr. De Rance, F.G.S., read on elaborate report of the work done by the committee during the last year, and it is evident the association consider the inquiry one of growing importance. Mr. T. Mellard Reade, C.E., F.G.S., followed with an individual report upon the wells of South-West Lancashire, in which he analyzed the information he had collected during the last three years, and demonstrated, by calculation of the water yielded by certain wells and bore-holes, that the yield of a well is dependent upon striking certain fissues or channels which ramify through the sandstone, forming ducts, conveying the underground water to the pumping-stations. These ducts, which may be vertical fissures or may be channels along the planes of bedding, like arteries, convey the water from large areas of sandstone that have absorbed the rainfall from surface percolation. He also showed that the wells are nearly all affected by local percolation, and insisted on the necessity in most cases of excluding the water from the strata immediatety surrounding the well, as it is liable to all sorts of organic contamination, by water-tight cylinders or tubbing. Mr. Reade's report was accompanied by sections showing the water-lines of the various wells, which will be published with the report, and no doubt will prove of considerable practical utility.

Health and Sewage of Towns.—The executive committee appointed in connexion with the recent conference on the Health and Sewage of Towns have issued a report, in which they state that the conference applied itself especially this year to the dry systems, as distinguished from the water-carried systems discussed last year, and have passed the following resolutions thereon:—1. That the pail system, under proper regulations for early and frequent removal, is greatly superior to all privies, cesspools, ashpits, and middens, and possesses manifold advantages in regard to health and cleanliness, whilst its results in economy and facility of utilization often compare favourably with those of water-carried sewage. 2. That hitherto no mode of utilizing the excreta has been brought into operation which repays the cost of collection. 3. That the almost universal practice of mixing ashes with the pail products, though it applies these as a convenient absorbent and possibly to some extent as a deodorant, is injurious to the value of the excreta as manure. 4. That, for use within the house, no system has been found in practice to take the place of the water-closet. 5. That, although there are appliances and arrangements by means of which the sewer gases may be effectually prevented from entering houses, they still do so in the great majority of dwellings, both in town and country, including the Metropolis. 6. That it is of the highest importance, in a sanitary point of view, that the Metropolitan and local authorities should exercise great vigilance with respect to this matter, and that it should be made by law the duties of these bodies to enforce efficient measures for the exclusion of sewer gases from dwellings, and to watch over their being efficiently carried out under such a system of payment as shall not press too heavily on those at whose charge the work is done. 7. That in every large town plans of its drainage should be deposited with the local authorities, and be accessible to the public. 8. That all middens, privies, and cesspools in towns should be abolished by law, due regard in point of time being had to the condition of each locality. 9. That the annual accounts of the sanitary authorities, especially in great towns, should be prepared and published in sufficient detail.

Manchester *v.* Thirlmere.—If the Bill for drawing water from Thirlmere is passed next year, a new and more formidable foe will have made good his footing in one of the most beautiful districts of England. The Corporation of Manchester propose to build a huge wall across the lower end of the lake, which will have the effect of making the area covered with water 700 acres instead of, as now, 335. The village of Withburn and the present road along the margin of the lake would be laid under water, and a new road would have to be cut at a higher level. That the whole character of the scenery would be changed is not, and indeed cannot be, denied. But the Corporation of Manchester modestly suggest that changes are sometimes improvements, and that, though the primary object of the scheme is to supply Manchester with water, it will, incidentally, have the further effect of enhancing the beauty of the lake. It

is impossible not to admire such heroic self-confidence; but, in so far as the scenery of Thirlmere is concerned, we should prefer to keep what we have got, rather than to take the chance of its being altered for the better at the cost and charges of the City of Manchester. Size is undoubtedly an element of sublimity, but then the size should be of nature's providing. To double the acreage of a lake by damming it up at one end may be an excellent plan from the point of view of a water company, but it is a little too risky to be accepted as an experiment in landscape gardening on a large scale. The embankment across the lower end of Thirlmere is not the only improvement in the scenery of the lakes which the corporation propose to effect. An air of classical antiquity is to be given to the valley between Rydal Water and Windermere, by the construction of a colossal aqueduct, varied, when a stream has to be crossed, by an "inverted cast-iron syphon-pipe." The valley between Ambleside and Rydal Water is in many places so narrow that the aqueduct will entirely fill the prospect, and the traveller who gazes down upon it from the mountain-side, or looks up at its solid roof as he takes shelter under it from some sudden storm, will have the Corporation of Manchester for ever in his mind, and, if he be given to strong language, on his lips also.—*Saturday Review.*

TESTIMONIAL TO MR. W. F. COTTON.—On Monday evening, Aug. 27, a meeting was held in the Mansion House, Dublin, for the purpose of presenting a testimonial to Mr. Cotton, the secretary of the Alliance and Dublin Gas Company. The Lord Mayor presided on this interesting occasion, and in his address as chairman he expressed his great pleasure in being the medium, on the part of the shareholders, of presenting Mr. Cotton with a testimonial to which he was so much entitled. It consisted of an address, a purse of 600 sovereigns, and a magnificent service of plate specially manufactured by Mr. Thomas Brunker, of Grafton Street. After the ceremony, the company adjourned, and were entertained in a most hospitable manner by the Lord Mayor, who proposed health and happiness to Mr. Cotton and family, and long life to enjoy the gift. The address was as follows:—

We, the undersigned, representing the shareholders of the Alliance and Dublin Consumers Gas Company, beg to express to you our very sincere thanks inasmuch as we fully recognize the importance of your great intelligence and uninterrupted labour to the advancement of that company in which we are interested. We are fully conscious of your wonderful fitness and adaptability for the positions of secretary and manager you occupy, and we candidly believe that your untiring exertions, as well as your great rectitude of character, had much to do in enabling the directors to bring the company to its present state of stability and prosperity. We, therefore, feel that the shareholders owe you a great debt of gratitude, and that obligation we but very inadequately discharge, when we now, in their name, request your acceptance of the accompanying piece of plate, together with a purse of 600 sovereigns, while we trust you will accept the same from us as a token of our recognition and appreciation of your valuable services to the company, and as a mark of our united and individual esteem.

Signed on behalf of the shareholders.

H. TARPEY, Lord Mayor.

DUKINFIELD GAS COMPANY.—During the past session of Parliament the Dukinfield and Denton Local Boards of Health obtained a Bill to purchase, at an agreed-upon price, the undertaking of this company, and on Thursday last the directors held their final meeting. At the conclusion of the ordinary business, the chairman of directors, John Chadwick, Esq., J.P., D.L., very feelingly alluded to the dissolution of the company, remarking how successful they had been, and how pleasant would be his recollections of his connexion with the undertaking. The company had been very fortunate in having a manager like Mr. Longworth, and it was a great pleasure for him (Mr. Chadwick) to state that during the whole period of Mr. Longworth's service, extending over nearly 15 years, he had never occasion to make a single adverse remark against the management. He wished Mr. Longworth every success in his career, and concluded the business by moving—"That the following testimonial be recorded in the minutes of the company, and that a copy of the same be engrossed on vellum, suitably framed by Messrs. Meredith, of Manchester, and then presented to Mr. Longworth." The motion was unanimously carried.

The Dukinfield Gas Company.
Board of Directors Meeting Aug. 30, 1877.

The directors of the Dukinfield Gas Company at this their last meeting cannot separate without expressing their unqualified satisfaction with the way in which its affairs have been conducted by Mr. Longworth during the time he has had them under his control, and attribute the success of the company principally to his integrity, perseverance, and ability, and have pleasure in appending to this testimonial that of the accountants, who for several years have audited the company's accounts.

Signed on behalf of the directors,

JOHN CHADWICK, Chairman.

Extract from Accountants Report, Aug. 17, 1877.

"In making this our last report we must compliment your manager, Mr. Longworth, on the manner the accounts of your company have been kept by him, and his attention and willingness to give us any information required at the several audits we have had the honour to attend from 1866 to the present."

(Signed) P. AND J. KEVAN, Public Accountants.

GAS AFFAIRS AT DARTMOUTH.—The *Dartmouth Advertiser*, speaking on this subject, says: "The Dartmouth Gas Company have come in for so much abuse at different times, though not without reason, that I should feel a pang of remorse to pass over unmentioned the praiseworthy stir being made in that quarter to enlighten our darkness. Up to a recent period the poorness of Dartmouth gas was equally notorious with its high price, and consumers grumbled in vain for an improvement in either. The company were told they managed badly, and they repudiated it strongly. The shareholders were twitted with a preference for lumpy dividends to better arrangements, and they swore it was false. But oversights will occur in the best regulated companies; and although the former manager was, and is still, deservedly respected by everybody acquainted with him, certain it is that on Mr. G. Edward Ohren taking the post, things got brighter, both as regards the gas and the price of it, and also the general arrangements. This, of course, was effected only at considerable cost to the company; and for a while the energetic manager worked under auspices not at all encouraging; but the fact that this feeling changed for one of mutual help serves only to show they were willing to expend as long as they saw the direction of it with the prospect of a proper return. Private consumers ceased to be annoyed with dull light, and were made aware that the fault had not been so much in the gas itself as in the barbarous means of emitting it. And now there is a marked difference in the street-lamps. Regulators have been affixed to them, which, while giving better light, burn less gas, and obviate the 'flying' of tops with heat, as was continually the case with the old method. By a simple means the light is reflected instead of being absorbed; and the inconvenient ladder of the lamplighter is supplanted by a rod capped with a protected light, and the duty is no longer a labour. The lamps themselves have undergone a thorough overhauling; they were in a sad state, for I understand that of the 84 not a dozen were sound. It is now proposed to expend some £200 in a means for exhausting the gas from the hydraulic, and forcing it through the different apparatus into the holders, which means a larger supply of gas, and a saving of 2000 feet on every ton of coal. Therefore, when these expenses have been somewhat recouped, a further reduction may be looked for."

Register of New Patents.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

635.—CLAYTON, L. and L., Hunslet, York, "An improved mode of and apparatus for punching metal plates to be used as gasholder top sheets." Feb. 15, 1877.

705.—LIVESEY, G. T., Old Kent Road, London, "Improvements in apparatus used in the purification of gas." Feb. 21, 1877.

726.—JOHNSON, S., Wood Green, and BURTON, R., Clerkenwell, London, "Improvements in gas-meters." Feb. 22, 1877.

727.—BUCHHOLZ, J. A. A., Hammersmith, London, "Improvements in the manufacture of gas for lighting purposes, and in machinery or apparatus connected therewith." Feb. 22, 1877.

770.—SMITH, J., jun., and DOWKER, W., Barrow-in-Furness, Lancs, "Improvements in apparatus for feeding fuel to furnaces, gas producers, and other combustion chambers." Feb. 24, 1877.

795.—DENNIS, T. H. P., Chelmsford, Essex, "Certain improvements in water-waste preventors." Feb. 27, 1877.

796.—MILNES, J., Milnsbridge, York, "Improvements in the construction of plug-taps and valves for water, gas, steam, and other purposes." Feb. 27, 1877.

819.—HALLEWELL, R., Blackburn, Lancs, "Improvements in gas motor engines and in the valves of such engines." Feb. 28, 1877.

840.—WIRTH, F., Frankfort-on-the-Maine, Germany, "A new filling for gas-meters." A communication. March 2, 1877.

959.—HARDISTY, G. E., Nottingham, "Improvements in cocks and taps." March 9, 1877.

1049.—WESTON, G., Sheffield, "An improved apparatus for the lighting and extinguishing of public and other lamps." March 16, 1877.

1127.—CLARK, A. M., Chancery Lane, London, "An improved process for preventing the accumulation of carbon in retorts used for the distillation of carburetted hydrogen." A communication. March 21, 1877.

1184.—PARIS, J., Stratford, Essex, "Improvements in flat-irons to be heated by gas and air, and in burners for the same." March 26, 1877.

1246.—YOUNG, W., Renfrew, N.B., "Improvements in the destructive distillation of coal and other bituminous substances, the same being in part applicable to the manufacture of oil and gas." March 29, 1877.

Share List of Metropolitan Gas and Water Companies.

(Corrected by Mr. F. N. GOLDING, *Sun Court, Cornhill, from the latest Stock Exchange Quotations.)*

Number of Shares issued.	Amount per Share.	Name.	Amount paid up per Share.	Last Divd. p.Cent. p. Ann.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d	£ s. d	£
10000	20	Anglo-Romano . .	20 0 0	9 0 0	20—22
5000	20	Bahia (Limited). .	20 0 0	2 0 0	11—13
1000	20	Do., do., redeem.	20 0 0	7 10 0	25—27
1500	20	Do., 2nd pref. . .	20 0 0	7 10 0	21—22
40000	5	Bombay (Limited).	5 0 0	7 10 0	6⅞—7¼
10000	5	Do., fourth issue.	4 0 0	7 0 0	5—5⅛
10000	20	British (Limited) .	20 0 0	10 0 0	40—42
7500	20	Cagliari (Limited).	20 0 0	5 0 0	18—19
5500001.	Sk.	*Commercial*	100 0 0	10 0 0	200—210
70000	100	Do., 7 per cent. .	..	..	146—150
20000	20	Continental Union.	20 0 0	6 0 0	20—21
10000	20	Do., new	12 10 0	6 0 0	½ds-¼pm
10000	20	Do., preference .	20 0 0	7 0 0	25-27 xd
75000	Sk.	*Crystal Palace District*	100 0 0	10 0 0	205—210
125000	Sk.	Do., 7 per cent. .	100 0 0	7 0 0	145—150
50000	Sk.	Do., preference .	100 0 0	6 0 0	138—142
23406	10	European (Limited)	10 0 0	10 0 0	17—18
12000	10	Do., new shares.	7 10 0	10 0 0	6 -7
35406	10	Do., new shares .	5 0 0	10 0 0	4—5pm.
37977701.	Sk.	*Gaslight & Coke* A.	100 0 0	10 0 0	198—205
1000001.	Sk.	Do. B.	100 0 0	4 0 0	85—90
50000	10	Do. 5 per ct. pref. conv., 4th issue.	8 0 0	5 0 0	7—8 pm.
50000	10	Do. do., 5th do. .	2 0 0	5 0 0	6¾-7¼pm
2000001.	Sk.	Do. C 10 p.c. pref.	100 0 0	10 0 0	217—222
3000001.	,,	Do. D do. do. .	100 0 0	10 0 0	217—222
1650001.	,,	Do. E do. do. .	100 0 0	10 0 0	217—222
300001.	,,	Do. F 5 do. do. .	100 0 0	5 0 0	109—114
600001.	,,	Do. G 7¼ do. do. .	100 0 0	7 10 0	150—160
13000001.	,,	Do. H	100 0 0	7 0 0	140—145
6200	5	Georgetown, Guiana	5 0 0	5 0 0	..
5800	10	Hong Kong (Lim.)	10 0 0	10 0 0	18—20
56000	50	*Imprl. Continental*	45 15 0	9 10 0	94—97
2500001.	Sk.	*London*	100 0 0	10 0 0	203—208
15000001.	Sk.	Do., 1st pref. . .	100 0 0	6 0 0	138—143
14450	Sk.	Do., 2nd pref. . .	100 0 0	6 0 0	125—135
4350	Sk.	Do., 3rd pref. . .	100 0 0	6 0 0	125—135
7632	25	Do., A shares . .	12 10 0	6 0 0	34—36
2680501.	All	Do., Debent. stk.	100 0 0	5l. & 6l.	..
15000	5	Malta and Mediterranean (Limited).	5 0 0	2 0 0	2—3
6000	5	Do., preference .	5 0 0	7 10 0	5—5½
20000	5	Mauritius (Limited)	2 0 0	..	¼—¾
25000	20	Monte Video (Lim.)	20 0 0	8 0 0	16—18
8000	10	Nictheroy, Brazil (Limited)	10 0 0	3 0 0	..
30000	5	Oriental (Calcutta).	5 0 0	9 10 0	7—7¾
30000	5	Do., new shares .	3 0 0	9 10 0	1¾-2¼pm
10000	5	Ottoman (Limited).	5 0 0	3 0 0	2—3
17500	10	Pará (Limited) . .	10 0 0	7 0 0	4½—5½
27000	20	*Phœniz*	20 0 0	10 0 0	41—43
5600001.	100	Do., new	60 0 0	7 10 0	108—113
1440001.	Sk.	Do., capitalized .	100 0 0	5 0 0	106—111
		Do., new, 1876. .	..	..	17—18pm
36000	20	Rio de Janeiro (L.)	20 0 0	10 0 0	31—33
7359	5	Singapore (Limited)	5 0 0	7 10 0	5½—5¾
2000	5	Do., preference .	5 0 0	7 10 0	5¾—6¼
1500	33⅓	Shanghai	32 10 0	12 0 0	30—32
4000	50	*South Metropolitan*	50 0 0	10 0 0	105—110
4000	12½	Do.	12 10 0	10 0 0	25—27
20000	12½	Do., new shares .	10 10 0	10 0 0	12½—13½
15000	10	*Surrey Consumers.*	10 0 0	10 0 0	20—21
10000	10	Do., new	8 0 0	10 0 0	7⅞-8¼pm
9000	4	United General . .	4 0 0	2 10 0	3 -3½
12000	100	*Wandsw. & Putney*	10 0 0	10 0 0	19—20
1500	10	Do.	10 0 0	7 10 0	11—12
2957	10	Do.	10 0 0	7 0 0	..
993	10	Do.	3 0 0	7 0 0	..
26000	5	*West Ham*	5 0 0	10 0 0	7⅞—8½
		WATER COMPANIES.			
12000	100	Chelsea	100 0 0	6 0 0	144—147
1800000	100	East London . . .	100 0 0	6 0 0	154—157
8000	50	Grand Junction . .	50 0 0	5 0 0	74—77
2160	25	Do., ¼ shares . . .	25 0 0	5 0 0	37½—38½
547960	100	Do., new ditto; max. div., 7½ p.c.	100 0 0	8 0 0	192—201
970	100	Kent	100 0 0	8 0 0	192—201
1161	100	Lambeth	100 0 0	6 5 0	145—148
442	100	Do., max., 7½ p.c.	100 0 0	6 5 0	142—145
4475	100	New River	100 0 0	7 0 0	320—350
400000	100	Do., deb. sk., 4 p.c.	100 0 0	4 0 0	103—105
3036	100	Southwrk. & Vauxh.	100 0 0	4 0 0	104—107
1296	100	Do., pref. stock .	100 0 0	5 0 0	113—116
..	100	Do., D shares . .	100 0 0	4 0 0	101—105
..	..	Do., 4½ preference	100 0 0	4 10 0	105—107
..	100	Do., new ordinary	..	4 10 0	..
1600	100	Do., new ord. No. 1	40 0 0	4 10 0	103—105
12172	61	West Middlesex . .	61 0 0	6l. p.sh.	132—136

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, and TWO MEDALS at the PHILADELPHIA EXHIBITION. have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

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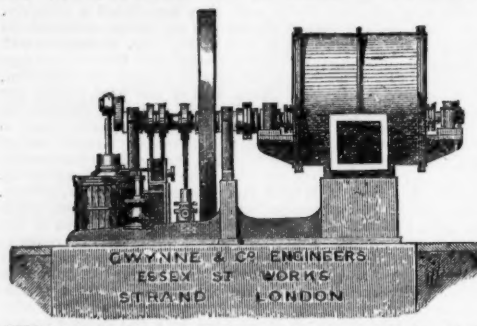
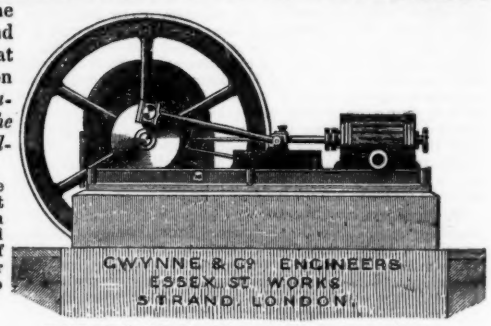


EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 7,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.



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Exhausters, with or without Engines combined, can be made to pass the gas without oscillation or variation in pressure. Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

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May 30, 1877.

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WANTED, a Fitter for a medium-sized town in the West Indies. He must be well up both in compo' and iron-pipe fittings. Good character indispensable.

Apply, with testimonials, to Ventura and Cabrera, 18, Coleman Street, LONDON, E.C.

WANTED, by the Advertiser, aged 38 years, a situation as WORKING MANAGER of a Gas-Work making from four to six millions. Fully conversant with the manufacture and distribution of gas, main and service laying, meter fixing, and all the details of a Gas-Work. Five and a half and 13 years testimonials.

Address, care of JOSEPH RICHARDSON, 112, West Stanley, via Chester-le-Street, county of DURHAM.

TRURO GAS COMPANY.

WANTED, by the above Company, a thoroughly practical Man as a GAS-FITTER. One who understands bronzing and lacquering would be preferred.

Applications, enclosing testimonials, with references, and stating wages expected, to be addressed to the Secretary, Mr. J. HAMILTON.

Dated, Truro, Aug. 30, 1877.

WANTED, by the Ryde Gaslight COMPANY, a CLERK or COLLECTOR, or Clerk only, who must be a neat and expeditious penman and accountant, thoroughly competent to keep books by double entry.

Applications, stating salary required, references, and other particulars, to be forwarded immediately.

GEORGE GARNETT, Secretary.

Gas-Works, Ryde, Sept. 1, 1877.

WANTED, a Smith accustomed to sheet-iron work and pipe-laying, who can be well recommended. Also a FITTER.

Apply to W. BUNCE, Ravens Lane, GREAT BERKHAMPSTEAD.

WANTED, the Address of Gas Officers who have not received a Copy of the New Edition of PAMPHLET for GAS COMPANIES to distribute to their Gas Consumers—"Cooking and Heating by Gas." A Copy will be sent free—extra Copies by post Threepence—direct from the Author, MAGNUS OHREN, Gas-Works, SYDENHAM, S.E.

SITUATION Wanted as Manager, ASSISTANT, or INSPECTOR. Has had several years experience in a London works, and five years in country works, as Assistant Manager, where the duties have been collecting accounts, meter-taking, &c., and understands thoroughly all branches connected with the distribution of gas. Wages required 30s. per week. Good references.

Address J. F. W., 15, Gilbert Road, Kennington, LAMBETH, S.E.

FOR SALE—One Exhauster by Jones, of Birmingham, capacity 25,000 feet per hour, with bye-pass, 12-in. inlet and outlet pipes and valves complete, in first-class working condition, price £40; also one Exhauster Regulator, with chain and weights complete, price £5.

Apply to CLAPHAM BROS., Ironfounders, &c., Keighley, YORKS.

TO BE SOLD CHEAP, a Horizontal STEAM-ENGINE of six-horse power, and Cornish Boiler 4 ft. 9 in. diameter and 8 ft. long, either together or separately.

The above have not been fixed since they came from the fitter's shop.

Apply to Mr. JOHN BUDDEN, Manager, Gas-Works, Poole, DORSET.

GASHOLDER FOR SALE.

ONE Telescopic Gasholder, 70 feet by 20 feet, complete, with cast-iron tank, columns, girders, and inlet and outlet pipes, valves, &c., of modern construction. In first-class condition, and made by Messrs. Piggott and Co., of Birmingham.

To be seen at work at the Gas-Works, Birkenhead.

Cause of removal to make room for extensions.

To be sold a bargain, taken down, and re-erected ready for work.

For particulars, apply to MESSRS. ASHMORE AND WHILE, STOCKTON-ON-TEES, or to view to Mr. CALLOW, Gas Engineer, BIRKENHEAD.

THE Directors of the Biddulph, Bradley Green, and Black Bull Gas Company, Limited, are prepared to receive TENDERS for the LEASE of their WORKS for a term of Five years.

Tenders to be sent in to the Secretary on or before Saturday, Sept. 22, 1877.

Particulars may be obtained from the Secretary.

The Directors do not bind themselves to accept the highest or any tender.

CORNELIUS E. LAMB, Secretary.

93, West Road, Congleton.

PHŒNIX GASLIGHT AND COKE COMPANY.

NOTICE is hereby given that the ADJOURNED HALF-YEARLY GENERAL MEETING of PROPRIETORS holding, previous to the 30th of June last, £300 paid-up capital and upwards in the said Company, will be held, pursuant to the Act of Incorporation, on WEDNESDAY, the 3rd of October, at Two o'clock precisely, at the Bridge House Hotel, in the Borough of Southwark, for the purpose of declaring Dividends to the 30th of June last, to make a call upon the new stock payable on the 1st of November next, and on other business.

The Transfer Books will be closed on and after the 12th of September, and opened on the 4th of October.

By order of the Court of Directors,

ISAAC ADOLPHUS CROOKENDEN, Secretary.

70, Bankside, London, S.E., Sept. 29, 1877.

CRYSTAL PALACE DISTRICT GAS COMPANY.

NOTICE is hereby given that the ORDINARY HALF-YEARLY GENERAL MEETING of this Company will be held at the Albion Tavern, Aldersgate Street, on THURSDAY, the 20th day of September, 1877, to receive the Report of the Directors, the Balance-Sheet confirmed by the Auditors, to declare a Dividend, to elect an Auditor in lieu of Mr. John Gray deceased, and for general purposes.

The Chair will be taken at Two o'clock precisely.

By order of the Board,

MAGNUS OHREN, Secretary.

Lower Sydenham, S.E., Aug. 24, 1877.

EXTRAORDINARY GENERAL MEETING.

NOTICE is hereby given that an Extraordinary General Meeting of the Crystal Palace District Gas Company will be held at the Albion Tavern, Aldersgate Street, in the City of London, on THURSDAY, the 20th day of September, 1877, at half-past Two o'clock in the afternoon (immediately after the Ordinary General Meeting of the Company), to consider and, if approved, to pass a Resolution to raise additional Capital.

By order of the Board,

MAGNUS OHREN, Secretary.

Lower Sydenham, S.E., Aug. 24, 1877.

TO COAL MASTERS AND COAL AGENTS.

THE Directors of the Dumfries Gaslight Company are prepared to receive TENDERS for a supply of COALS, from 1000 to 4000 Tons, to be delivered free at the Dumfries Station as required by the Manager.

Analysis to show at least 27 candles, combined with good Coke.

Tenders to be addressed to Mr. MALAM, Gas Manager, Dumfries, on or before the 15th current.

Gas-Works, Dumfries, Sept. 1, 1877.

GAS PLANT FOR SALE, suitable for Small Works:—

Seventeen 4-inch and 3-inch H-Pipes.
Eighteen 15-inch Circular Mouthpieces.
A 6-inch Governor.
A Station-Meter, to pass 6000 cubic feet per hour.
Scrubber and Washer combined; very good.
Vertical Condenser; very good.
Seven 7-feet lengths, 12-inch D-shaped Hydraulic Main.
Two Gasholders, each capable of holding 15,000 cubic feet.

Apply to the ENGINEER, Phœnix Gas Company, GREENWICH.

Now ready, price One Shilling, No. 9 (to be continued Monthly) of

A TREATISE ON THE SCIENCE & PRACTICE

OF THE

Manufacture and Distribution

OF

COAL GAS.

LONDON: WILLIAM B. KING, 11, BOLT COURT, FLEET STREET,

OR OF ANY BOOKSELLER IN TOWN OR COUNTRY.

For the convenience of persons resident in remote districts, arrangements have been made by the Publisher to forward the "Treatise" by Post, securely packed, at the cost of 1s. 2d. Monthly, or 7s. for the Half Year.

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ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

GAS PURIFICATION.

BAILES & HALLSWORTH,

CONTRACTORS FOR THE

PURIFICATION OF COAL GAS,

BY THEIR

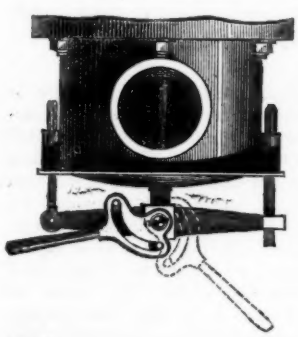
PATENT OXIDE OF IRON COMPOUND.

The material is in use at most of the principal Gas-Works in Yorkshire and elsewhere. It contains considerably less moisture than natural Oxide of Iron. It is much cheaper and more efficient as a purifying agent.

B. & H. are purchasers of Spent Oxide, or will take Spent in exchange for New Material.

FOR SAMPLES AND TERMS, ADDRESS—

BAILES & HALLSWORTH, COPPERAS WORKS, ARMLEY, LEEDS.



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RETORT-LID FASTENINGS

Have now stood the test of experience, and have been found one of the greatest improvements in retort-house appliances yet invented. All who desire security and economy should give them a trial.

Prices and further particulars will be given on application to

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GAS-WORKS, STAFFORD.

J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

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ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—All Communications to be addressed to the FIRM ONLY.

Now ready, price 5s., by post 5s. 3d., cloth, 8vo., gilt lettered,

SULPHUR COMPOUNDS IN GAS.

A full Report of the Evidence given before the Select Committee of the House of Commons on the Bills of The Gaslight and Coke Company and the Crystal Palace District Gas Company in the present Session.

Now ready, price 18s., bound in cloth, gilt lettered,

THE TWENTY-NINTH VOLUME

(JANUARY TO JUNE, 1877,)

OF THE

JOURNAL OF GAS LIGHTING, WATER SUPPLY, AND SANITARY IMPROVEMENT.

LONDON:

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, E.C.

NOTICE.

MESSRS. THOMAS DOCWRA & SON, Contractors, Balls Pond Road, hereby give notice that they have no business connexion with any other person of the same name.

TENDERS FOR NEW GAS-WORKS.

THE Directors of the Gaslight and Coke Company, Highbridge, Somerset, are prepared to receive TENDERS for BUILDINGS and GAS APPARATUS for lighting the district.

Contract No. 1, Building Work complete; and No. 2, Apparatus together or separately.

The plans and specifications may be seen, and all particulars obtained, on application to the undersigned, Post Office Chambers, Exeter, Devonshire.

Sealed tenders are to be delivered at my Office on or before Twelve o'clock noon, on Friday, the 14th day of September, and endorsed respectively, "Tenders for Buildings," &c., "Tenders for Gas Apparatus," &c.

The Directors do not bind themselves to accept the lowest or any tender.

By order,

THOMAS DAND, C.E., Consulting Engineer.

Post Office Chambers, Exeter,

Sept. 1, 1877.

DEVIZES CORPORATION WATER-WORKS.

THE Town Council of the Borough of Devizes, acting as the Urban Sanitary Authority, desire to receive TENDERS for carrying out the Works specified in the following Contracts.

CONTRACT No. 2.—For the manufacture and delivery of about 15,000 yards of Cast-Iron SOCKET-PIPES, varying in diameter from 8 in. to 3 in., and the necessary Special Castings.

CONTRACT No. 3.—For the LAYING of the Cast-Iron Water-Pipes, and fixing Sluices, Hydrants, &c.

The plans, sections, and specifications, &c., may be seen at my Offices, in Devizes, or at the Office of the Engineer, Mr. Henry Tomlison, 4, Bene't Street, Cambridge.

Tenders are to be delivered at my Office on or before Twelve at noon, on Monday, the 10th of September next, sealed, and endorsed respectively, "Tender for Pipes, &c.," "Tender for Pipe-Laying."

The Corporation do not bind themselves to accept the lowest or any tender.

A. GRANT MEEK, Town-Clerk.

Devizes, Aug. 24, 1877.

IN THE HIGH COURT OF JUSTICE.

CHANCERY DIVISION.—MASTER OF THE ROLLS.

In the Matter of

THE COMPANIES ACTS, 1862 and 1867,

and of

THE BARKWAY (HERTFORDSHIRE) GAS COMPANY, LIMITED.

TO BE SOLD BY AUCTION, Pursuant to an Order made in the above matter, and with the approbation of His Lordship the Master of the Rolls, the Judge to whose Court such matter is attached, by Mr. Edward Nash (the person appointed by the said Judge), at the Bull Inn, at Royston, in the county of Hertford, on WEDNESDAY, Sept. 12, 1877, at Four for Five o'clock, in ONE LOT, the BARKWAY GAS-WORKS, comprising a Freehold Site containing one rood (more or less) east of the High Street, at the south entrance to the town, on which is erected the brick and slated range of Coal Stores; Retort-House (Iron Roofed); Purifying, Meter, and Lime Houses.

The fixed Plant consists of two 14-inch Retorts (Hydraulic) with 3-inch Piping; eight-tube Vertical Condenser; Two Purifiers, with traveller; Station-Meter; 20-ft. circular Gasholder (10-ft. Lift) with iron frame and counter-balance, working in brick tank; Tar Tank with pump, and Water Well with pump; Regulating Valve; and 1000 yards (more or less) of Cast-Iron Main (principally 3-inch) as laid up the High Street, with services to street-lamps; 13 Cast-Iron Posts and one Iron Bracket, with lamps and fittings, and branch services to shops and houses, with about 40 private meters.

The moveable Plant comprises a new 14-inch Iron Retort; 4 extra Doors; Test-Meter; Four 3-light and one 5-light Consumers Meters; Ladder, Fire Irons, two Shovels, Wheelbarrow, a 56-lb. Weight, Skip, one old Meter, one Syphon Box, a Force, four Tap Boxes, two Brass Cocks, and about 100 feet of Welded Iron Tube.

The Works were constructed within a few years past by Mr. George Bower, of St. Neots. They are well placed, and arranged to supply the town with gas, for which the principal shops and houses have fittings and burners, and but a small outlay is required to again commence business.

FREEHOLD. TITHE FREE.

The property may be viewed on application to John Dodkin, of Barkway, living in the house adjoining the Works.

Particulars and conditions of sale may be had gratis of Arthur Nash, Esq., Solicitor, Royston; of Messrs. Church, Sons, and Clarke, Solicitors, 9, Bedford Row, London; of R. Rabbidge, Esq., the Official Liquidator, 17, King Street, Cheapside; and of the Auctioneer, at ROYSTON.

MICHAEL & WILL'S GAS AND WATER SUPPLY.

In the press, and will be immediately published, in 1 vol., 8vo.,

THE LAW OF GAS AND WATER SUPPLY. Second Edition, considerably enlarged and amended, and partly re-written, being a Manual of the Law as to Companies and Local Authorities with respect to the Supply of Gas and Water. By W. H. MICHAEL and J. SHIRESS WILL, of the Middle Temple, Esquires, Barristers-at-Law.

London: BUTTERWORTHS, 7, Fleet Street, Her Majesty's Law Publishers.

T. NEWBIGGING,
CONSULTING GAS ENGINEER,
5, NORFOLK STREET, MANCHESTER.

HENRY LYON,
ENGINEER,
AND
CONSULTING GAS ENGINEER,
BARTON HOUSE, opposite BARTON ARCADE,
DEANSGATE, MANCHESTER.

ALFRED LASS,
SPECIAL ACCOUNTANT FOR GAS COMPANIES,
30, GRACECHURCH STREET, LONDON.

Accounts analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by A. L. to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, and have been universally approved.

The above forms are registered.

Water Companies Accounts also prepared and adjusted.

CONSULTATIONS.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

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Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, WESTMINSTER.

CATHELS'S Patent Gas-Washer is an excellent cleanser of gas from tar, ammonia, sulphur, and carbonic acid, reducing the cost of subsequent purification 30 to 50 per cent. Needs no motive power or attention beyond drawing off and recharging as required. Has no moving parts or complications to get out of order. Is of moderate cost, and is practically indestructible.

Application to be made to the MANUFACTURERS, the Horseley Company, Tipton, STAFFORDSHIRE.

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DRILLING CLIP.

No. 1 takes from 2-in. to 6-in. Mains.
No. 2 takes from 6-in. to 12-in. Mains.

GARSIDE'S REGISTERED TUBE-VICE takes ¾ brass to a 2-in. Socket.

May be had direct from the maker, SAMUEL GARSIDE, Gateshead Iron-Works, ASHTON-UNDER-LYNE.

SULPHATE OF AMMONIA.

WHY sell your Liquor when it pays you better to work it up yourselves?

Consult J. JUDGE, Chemical Plumber, Burner, &c., who has put up several sets for Gas Companies with success. Saturating Tanks, &c., made to order. Success sure, and nuisance got rid of.

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WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of
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MANUFACTURERS OF
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SCOTSWOOD FIRE-BRICK WORKS,
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HEBBURN MAIN GAS COALS.

T. Stone, Esq., of Weymouth, writes on Nov. 17, 1876: "I have used about 12,000 tons of this Coal, with, I think, the best possible results, although not always under the most favourable circumstances. My Coal account made up to Midsummer last showed a makeage of 10,524 cubic feet per ton of 14¼-candle gas, and not a hundredweight of Cannel used. This statement would, I know, be incredible to many men, and may provoke the remark, 'How much of it is paid for?' For the gratification of such, I have to say that, of the above quantity, 9866 cubic feet per ton of Coal carbonized were brought to charge and duly paid for, with the exception of about 6s. per cent. for bad debts. The coke is of excellent quality. The above facts I hold to be a greater recommendation to your Coal than any words of mine could be."

THE TYNE COAL COMPANY, LIMITED, OWNERS.
W. RICHARDSON, Fitter,
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Now ready,

THE GAS & WATER COMPANIES DIRECTORY
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FOR TOWNS, COUNTRY MANSIONS, &c.

Estimates given free of Charge.

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STOURBRIDGE (Established 1834),
MANUFACTURER OF EVERY DESCRIPTION OF
Burs, Lumps, Stays, Shields & other Bricks, & Gas-Retorts.
A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular .	14 in.,	15 in.,	16 in.,	18 in.
Ovals . .	17 in. × 14 in,	17 in. × 15 in.,	20 in. × 15 in.,	21 in. × 15 in., &c.
D's. . .	14 in. × 14 in.,	15 in. × 12 in.,	15 in. × 13 in.,	17 in. × 14 in., 18 in. × 13 in.
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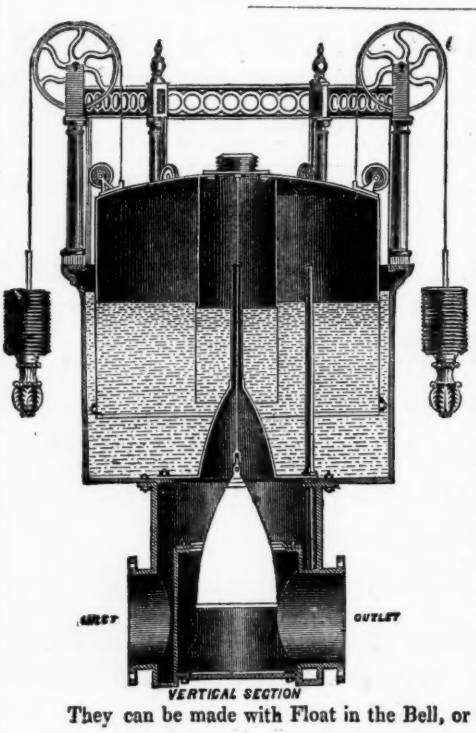
Special attention given to the execution of Export Orders.

J. & J. BRADDOCK,
GLOBE METER-WORKS,
OLDHAM,

Beg to submit to Gas Engineers their

PATENT COMPENSATING GAS GOVERNOR,

Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



VERTICAL SECTION

The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 24-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

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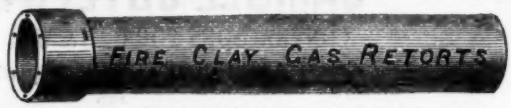
Manufacturers of FIRE-BRICKS, LUMPS, TILES,



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CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

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OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

MOORE'S PATENT DIP-PIPE.

THE advantages of this Dip will be seen from the engraving. It is thoroughly effectual in its working, removing the whole of the pressure of the hydraulic main from the retort, thus causing a great saving in gas. It is very easy of manipulation, requiring little care and attention; it cannot get out of order, and, when shut, works as an ordinary Dip-Pipe. No accumulation of carbon in retort. Can be fixed to existing H-pipes.

In ordering the Dip, the distance from top side of hydraulic main to water-level should be stated; also the Dip at which it is required to work when the valve is shut.

PRICES—3-in., 35s.; 4-in., 42s.; 5-in., 48s.

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To whom all communications should be addressed.

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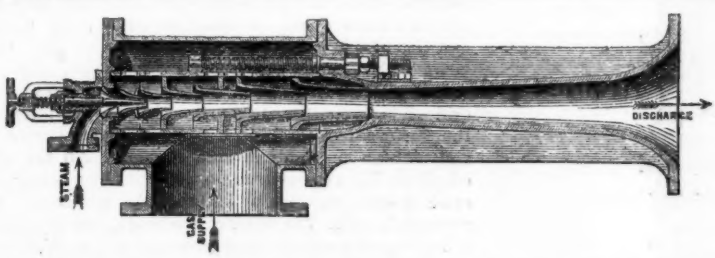

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IMPROVED CLELAND'S PATENT.

UPWARDS OF 250 IN USE.

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Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

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Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydro-carbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

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BUYERS OF COAL TAR,

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AMMONIACAL LIQUOR, &c.

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These Paints have been for many years extensively used in Her Majesty's Royal Dockyards, Woolwich Arsenal, the Shorncliffe and Curragh Camps, War Departments, and Colonies, and are largely supplied to Railway, Harbour, and GAS COMPANIES, Shipowners, Engineering Establishments, Railway Carriage and Wagon Works, and the Paint Trade generally. They are the BEST PROTECTORS of WOOD, CEMENT, and IRONWORK, even arresting corrosion after it has set in; and their base being oxide of iron, they are free from those properties which make lead paints so destructive to iron. They do not scale or blister, are not affected by great heat, and are the only Paints which will resist the effects of sulphuretted hydrogen. Their DURABILITY and covering properties have borne the test of A QUARTER OF A CENTURY'S PRACTICAL TRIAL.

The undermentioned colours—ground in best linseed oil, and requiring only to be thinned down for use in the ordinary way—are kept in stock:—

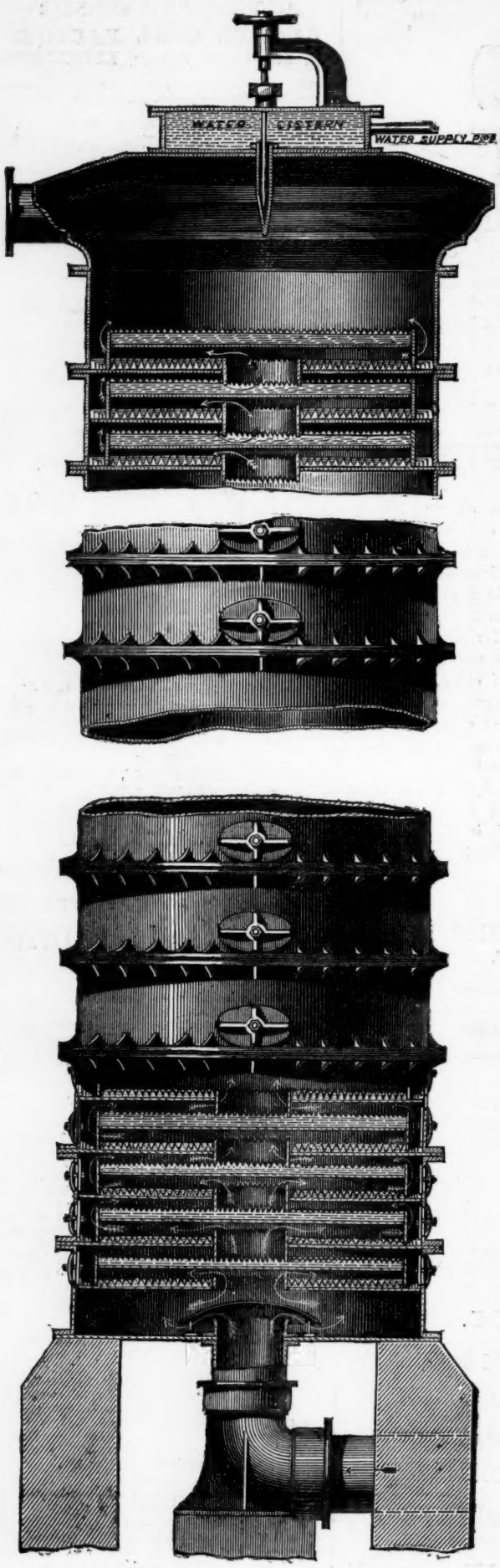
Torbay Brown.	Torbay Red.
Dart Green.	Slate.
Dart Yellow.	Buff.
Brixham Black.	Torbay Chocolate.
Light Blue.	Cream Colour.
Dart Brown.	Dart Umber.
Imperial Stone.	Light Stone.
Bronze Green.	Salmon Colour.
Navy Green.	Lead Colour.
Carriage Red.	Dark Stone.
Light Lead.	Crystal Palace Blue.
Light Green.	Iron Grey.

All other Colours made to order.

READY-MIXED PAINTS.

A great variety of Colours ready mixed for the brush are also always kept in Stock, in 3 lb., 7 lb., 14 lb., and 28 lb. cans.

Prices and Testimonials on application.



SAMUEL CUTLER & SONS

CONTRACTORS FOR GAS & WATER WORKS,
GENERAL ENGINEERS, IRONFOUNDERS;
AND
MANUFACTURERS OF

Gasholders, Tanks, Purifiers,

SCRUBBERS, VALVES, EXHAUSTERS,

IRON ROOFS,

BRIDGES, BOILERS, AND GENERAL CAST AND WROUGHT IRON WORK.

S. C. & Sons undertake the entire Erection of New, or Remodelling of existing Gas-Works in any part of the World, including small Works for MANSIONS, FACTORIES, &c., or Works of the largest extent (are now constructing the largest Gasholder yet erected); also the Supplying and Laying of MAINS.

They make a speciality of supplying every requisite whatever for a Gas-Work, keeping in Stock what are most in request. WOOD SIEVES for Purifiers and Scrubbers, of a superior make.

SPECIAL CASTINGS to Drawing or Pattern at Shortest Notice.

MANUFACTURERS OF

CUTLER'S PATENT GAS-WASHER

AND

MORRIS & CUTLER'S PATENT CONDENSER.

(For Illustration and Description, see "Journal" for Aug. 21, page 312.)

DESCRIPTION OF CUTLER'S PATENT GAS-WASHER.

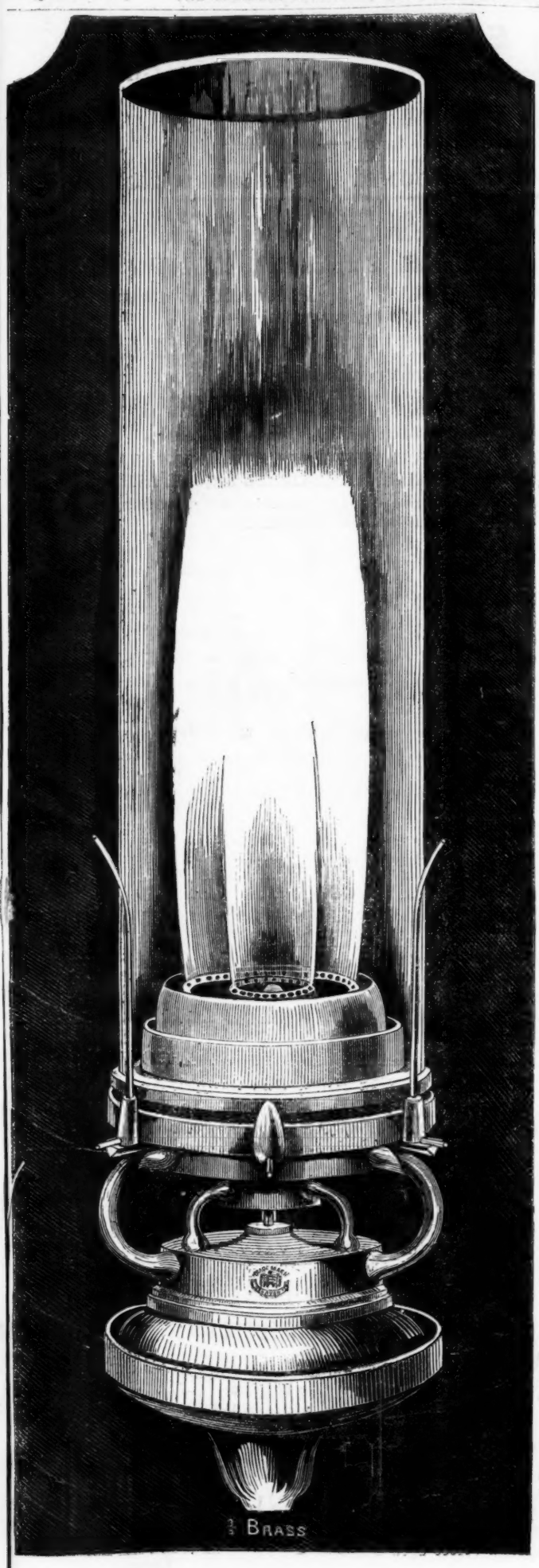
The Washer consists of a vessel or tower of a cylindrical or other form, convenient to the site available for it. The interior is fitted with a number of dished trays arranged as shown, one above the other, from bottom to top. The flanges or sides of these trays are formed with serrated edges, and are arranged so that each tray contains a certain depth of water or liquor; the position and size of the serrated orifices in the dipping edges being such that the upper parts are slightly above the water, and so that the combined area of these small orifices is proportionate to the size of the inlet-pipe, the gas passing through without increase of pressure, and diffused in thinly divided streams. All the other edges are likewise serrated, so that the liquor passes over same in small streams, and so that the gas cannot pass through in bulk. The water or washing liquor is admitted at the top, the supply being governed by a conical needle regulating-valve so that the amount can be regulated to any desired quantity. The gas is admitted at the bottom and out at the top, the water or liquor descending the one meeting the other, and thus being brought into the very closest contact, and the gas consequently being deprived of its ammonia and other impurities absorbed by water or other liquor.

Where a slight increase of pressure is not of great consequence, we prefer to allow some of the lower tiers of trays to be slightly sealed, the better to arrest any tar or heavy oils that may have passed the condenser.

For further Particulars, apply to

S. CUTLER & SONS,

PROVIDENCE WORKS, MILLWALL,
(NEAR THE STEAMBOAT PIER,)
LONDON, E.



PARIS, 1867.

LONDON, 1862.

WILLIAM SUGG,

GAS ENGINEER,

VINCENT WORKS, VINCENT ST.,

WESTMINSTER, S.W.

PATENT

"LONDON" ARGAND BURNER,

NEW SIZE, No. N., DOUBLE FLAME,

With Self-Acting Governor.

LIGHT EQUAL TO 45 Parliamentary Sperm Candles of Six to the Pound.

Will burn any Quality of Gas from 12 to 50 candles, with

A VERY WHITE AND STEADY LIGHT.

Price 18s. each, with Chimney.

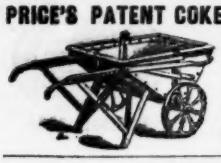
☞ **This Burner gives a greater amount of light per cubic foot of gas consumed than any other Burner yet produced.**

It can be used with Albatrine Shade, 20-in. diameter, for large Dining-Rooms or Halls; or with Large Silvered or Enamelled Reflector for Shops or Warehouses; or for Harbour and Signal Lights, Clock-Towers, &c.

The Sizes of the Patent "London" Argand Burner are now as follows:—

OLD SIZES: Nos. A, B, C, D, E, F, G, and H.
NEW SIZES: J, K, and N.

PRICE'S PATENT COKE & COAL BARROW



effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

THOMAS LAMBERT & SONS

MANUFACTURE EVERY DESCRIPTION OF

GAS AND WATER FITTINGS;

ALSO,

WROUGHT-IRON TUBES & FITTINGS.

SHORT STREET, LAMBETH, LONDON.

HOPKINS, GILKES, & CO.,

LIMITED,

MIDDLESBOROUGH,

SUPPLY GAS & WATER PIPES of EVERY SIZE.

Plain, Turned and Bored, and Coated.

CAST-IRON RETORTS.

Castings for Gas-Works of every description.

EXHAUSTERS.

LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & CO., GHENT, will receive immediate attention.

JAMES NEWTON & SONS,

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE,

SOUTHWARK, LONDON, S.E.,

DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

CLOTH GAS-BAGS FOR MAINS,

As supplied to the Imperial, Chartered, and other London and Provincial Gas Companies. Bellows and Valves for inflating Well Dresses, Stokers Gloves, India-Rubber Suction and Delivery Hose, Gas-Tubing, Leather, India-Rubber, and Gutta-Percha Machine-Bands, Sheet and Washers, and Steam Joints.

T. BUGDEN, Manufacturer,

79, GOSWELL ROAD, LONDON, E.C.

E. & W. H. HALEY,

General Ironfounders and Makers

OF

CAST-IRON GAS AND WATER PIPES.

Sizes 1¼ to 15 inches.

LISTER HILLS FOUNDRY, BRADFORD, YORKSHIRE.

S. OWENS & CO.,

WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT STEAM-PUMPS,

More than 10,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

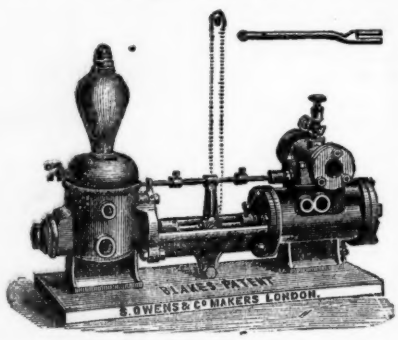
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF

MANN & OWENS

IMPROVED PATENT GAS-VALVES.

PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

THE WIGAN COAL & IRON COMPANY,

LIMITED.

DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES

TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

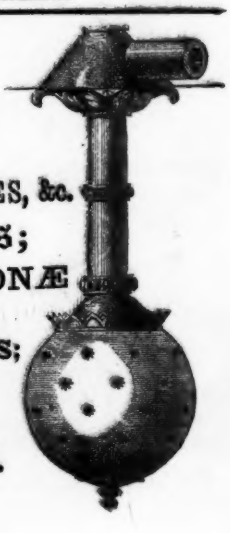
COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

100, HATTON GARDEN, LONDON.



Drawings and Prices upon application.

ARBITRATIONS, VALUATIONS, ASSESSMENTS

AND PARLIAMENTARY APPLICATIONS CONDUCTED

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE,

MANUFACTURERS OF EVERY DESCRIPTION OF

GAS APPARATUS;

CONTRACTORS FOR THE

ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

ALDER AND MACKAY,

GRANGE WORKS, EDINBURGH,

MANUFACTURERS OF

CONSUMERS IMPROVED GAS-METERS;

IMPROVED DRY GAS-METERS, in Cast-Iron and Tin Cases,

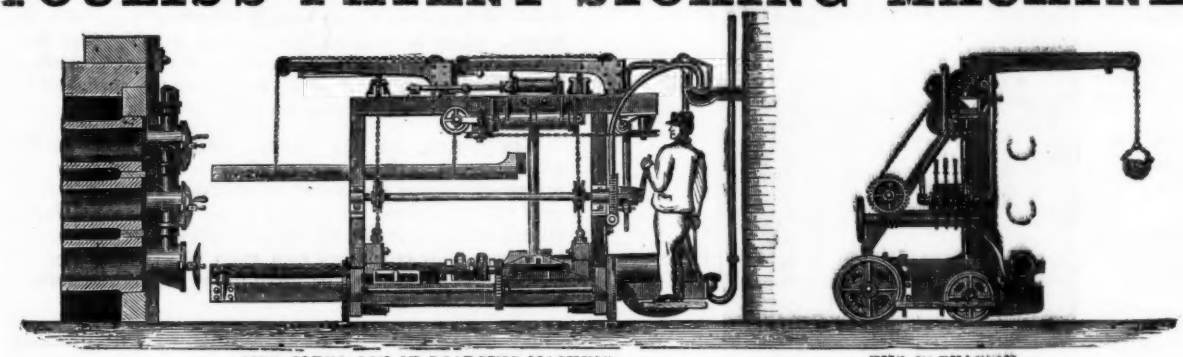
OF THE HIGHEST EXCELLENCE,

Warranted to measure correctly, and not to vary.

STATION METERS AND GOVERNORS,

EXPERIMENTAL METERS, PHOTOMETERS, GASHOLDERS, &c.

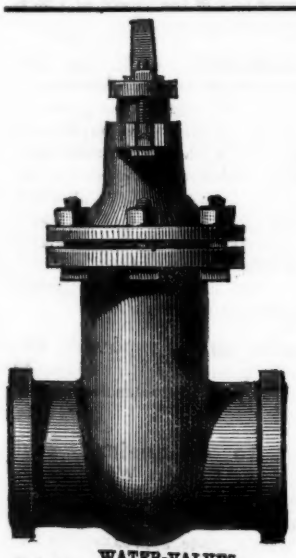
FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF CHARGING MACHINE. END ELEVATION

(The Drawing Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz;
Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.



WATER-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 1000 feethead.

SIMPSON & COMPANY,

ENGINE-WORKS,

GROSVENOR ROAD, PIMLICO,

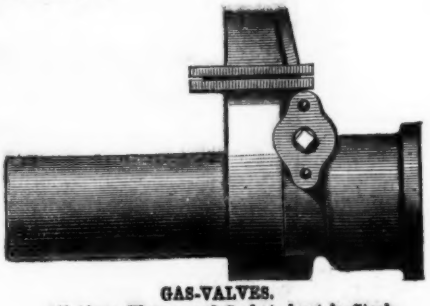
LONDON.

SCREW-COCKS, HYDRANTS,

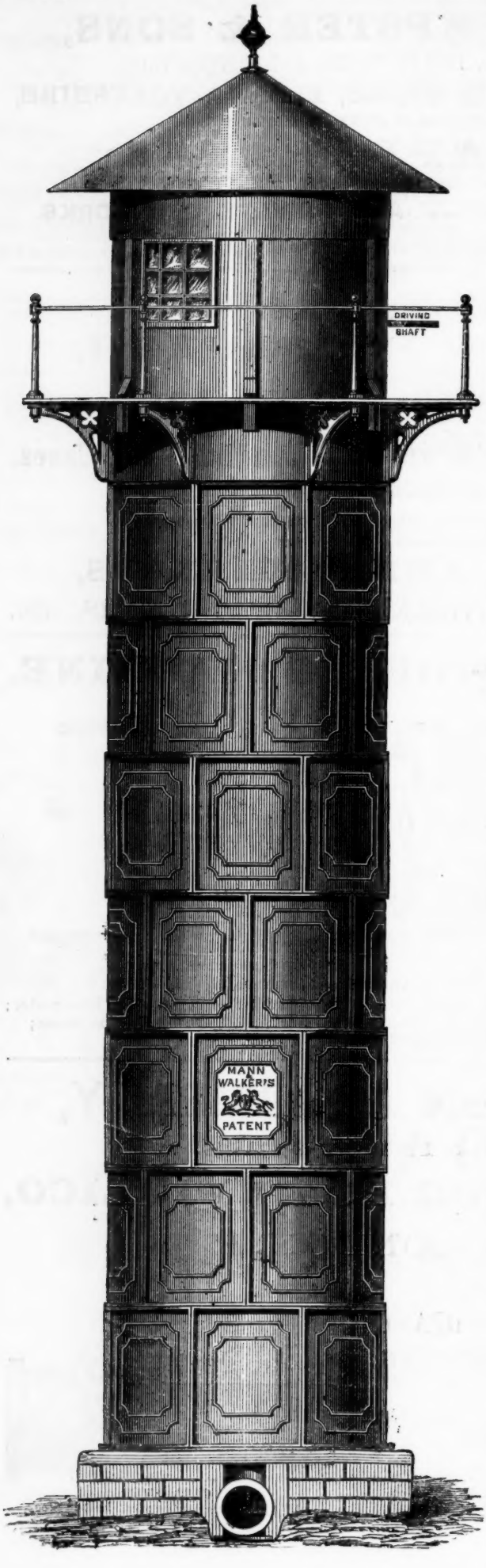
SLUICES, PENSTOCKS,

And all other Machinery for

WORKS OF WATER SUPPLY, DRAINAGE AND IRRIGATION.



GAS-VALVES.
All Sizes, Flange and Socket, kept in Stock, tested to 100 feet head.



C. & W. WALKER,
8, Finsbury Circus,
London, E.C.

MANN & WALKERS' PATENT SCRUBBER.

By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the im-portant results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, re-quiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET. BIRMINGHAM.

ESTABLISHED 1807.

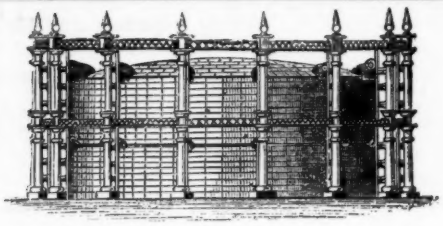
MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

LESMAHAGOW CANNEL COAL.

FERRAND DAVIES,

148, GRESHAM HOUSE, OLD BROAD STREET, LONDON, E.C.,

SOLE AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL.

Quotation and Analysis forwarded on application.

G. J. EVESON,

GAS COAL AND CANNEL FACTOR,

Has on offer, in quantities to suit purchasers, Best Wigan Arley Mine, Orrell Screened and Unscreened Gas Coal and Nuts; Best Yorkshire, Real Old Silkstone, Derbyshire, and North Staffordshire Screened and Unscreened Gas Coal and Nuts; also Best Lancashire, Yorkshire, Derbyshire, and other Cannel, as supplied to some of the principal Gas Companies in England, to whom references are permitted.

Analysis and Prices forwarded on application to

HEAD OFFICES, STOURBRIDGE.

N.B.—Gas Managers will oblige by advising when they will be prepared to receive Tenders.

STOURBRIDGE FIRE-BRICKS, RETORTS, CLAY, &c.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

WILSON CARTER & PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or export Best Wigan Arley Gas Coal and Nuts; best qualities of the Derbyshire, Yorkshire, and North Staffordshire Gas Coals and Nuts; also the best descriptions of Lancashire, Welsh, Scotch, and other Cannel.

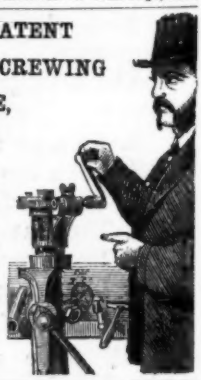
Messrs. WILSON CARTER & PEARSON, being contractors to several of the principal Gas Companies in the Midland Counties, have pleasure in being enabled to give them as references.

Chief Offices: Temple Buildings, 50, New Street, Birmingham.

London Offices: 6, Great Winchester St. Buildings, E.C.

GRIRDROD'S PATENT

PORTABLE PIPE SCREWING MACHINE,



For 1 in., 1¼ in., 1½ in., and 2 in. Gas Threads, complete £7 10s.

In use at the chief gas-works, and giving great satisfaction.

For other useful goods, see Bailey's "Illustrated Inventions," post free 3s. 6d.; gratis to ledger customers.

W. H. BAILEY & CO.,

Brassfounders, Gauge Injector and Tool Makers,

ALBION WORKS, SALFORD, LANCASHIRE.

ALBERT GAS COAL.

THE DERBYSHIRE

SILKSTONE COAL COMPANY,

LIMITED,

CAN OFFER A

GAS COAL

Of superior quality, delivered in trucks at any Railway Station in England, or shipped on board at Hull, Grimsby Docks, or Barrow-in-Furness.

Purified gas per ton of coal in cubic feet (average)	**10,262**
Illuminating power in candles	**15·86**
Weight of coke in lbs. per ton of coal	**1,502**

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

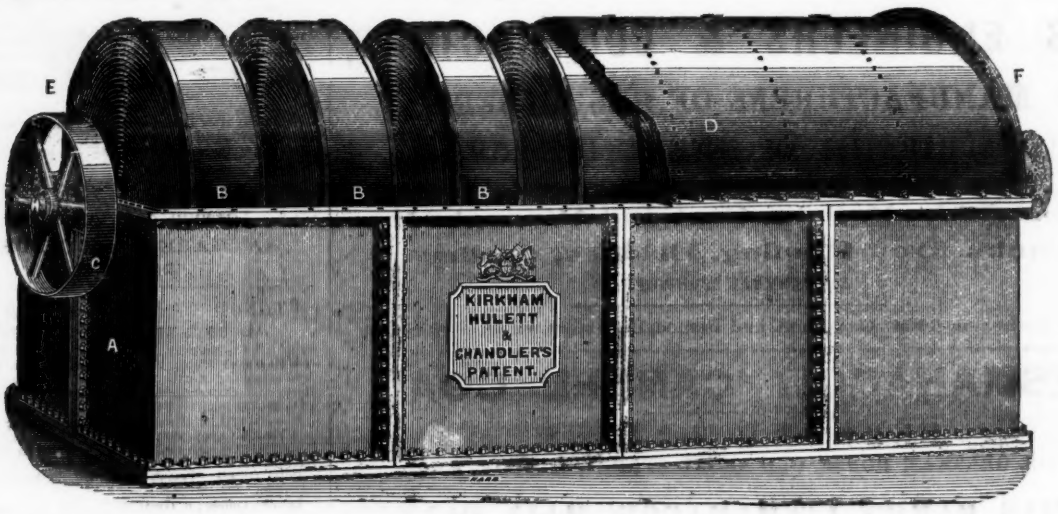
JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

STANDARD WASHER AND SCRUBBER.



The advantages of the Apparatus will doubtless be understood by those interested in gas manufacture.

The principal points of any Apparatus for the extraction of ammonia may be summarily stated as follows: —

1. **A large amount of Surface is desirable.**
2. **Such Surface should be always effectually Wetted.**
3. **The Surfaces or Scrubbing Material should cause no Pressure.**
4. **The Gas should meet various strength Liquors on its course.**
5. **However small the quantity of Water used, it ought to operate over the whole Surface.**
6. **Changing Scrubbing Material is both Objectionable and Expensive.**
7. **Economy both as to Space occupied and Cost of Apparatus is an important item.**

All these requisitions are supplied by the above Apparatus, of which the following is an explanation:—

A is a cast-iron tank, formed into several separate water-tight compartments.

B B B volutes of sheet iron fitted to the centre shaft, which is driven by the pulley, C, and causing the said volutes to revolve each in a separate compartment filled with water or other fluid.

D, the cover, has partitions fitted into it corresponding with those in the tank, sufficient space being left between the top of the partition in the tank and the lower edge of that in the cover, to allow the gas a free passage through the first volute to the second, and so on to the third, fourth, &c.

The action is as follows:—The crude gas entering at E is partly washed in the first compartment, which becomes 10 or 12 oz. liquor, or stronger if required, according to the quantity allowed to enter per ton; the gas then passes to the second, where the liquor is of a less strength; thence into a weaker liquor, as it passes from one compartment to the other, finishing at the last compartment or outlet, F, with clean water, which is constantly flowing and running over from one compartment to another, until it reaches the last space, from which it flows from the outlet-pipe into the well or tank ready for sale or removal.

Taps are inserted in each compartment for the convenience of drawing liquor for testing, &c.

Applications as to Cost, &c., may be obtained of either

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